July 1943

THE FOUNDRY

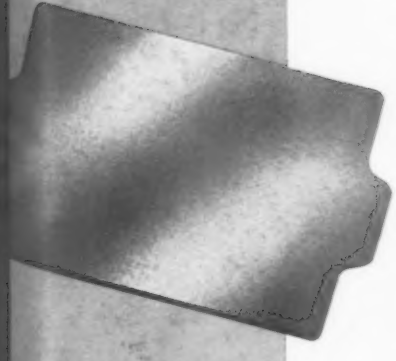
FIFTY-FIRST YEAR

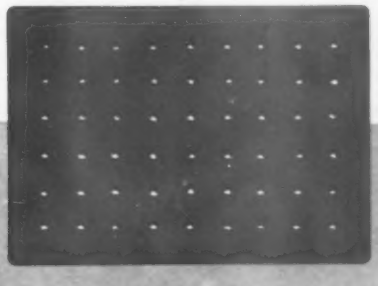
★ ★ ★ ★ ★ ★ ★

MOLTRUP

STEEL FOUNDRY PLATES

Our Flattened Steel pattern plates, core plates and bottom plates are made in all standard sizes and shapes. They can be tailormade easily to your particular foundry requirements. The economy of Steel foundry plates is without question—they last for years. They stay flat permanently. You can get them without undue delay. Anticipate your needs by ordering today.





attern Plates . . . Core Plates . . . Bottom Plates

MOLTRUP

TRUP STEEL PRODUCTS CO., BEAVER FALLS, PA., PITTSBURGH DISTRICT

R V.712 July-Dec. 1943

THE DEMAND FOR CASTINGS TURNS

night INTO day

Castings are required to give life and purpose to the armaments of modern war. When foundries shut down, tanks and bombers freeze on the assembly lines . . . ships sit motionless on the ways. That's why foundrymen now work night and day.

Purite, the scientific flux, is an invaluable aid in the delivery of maximum output of sound, tough gray iron and converter steel castings. In the cupola Purite prevents oxidation and reduces sulfur pick-up by the metal . . . in the ladle it removes sulfur as required to meet specifications. In both applications Purite refines the iron . . . that means stronger, cleaner castings and fewer "rejects."

Purite speeds production . . . lowers costs. Write for Mathieson Bulletin P-41 describing the different uses of Purite.

Purite

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42ND STREET, NEW YORK, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

SODA ASH IN ITS MOST EFFICIENT FORM FOR METALLURGICAL PURPOSES

One place we like to see Jap flags

Neatly painted on the dirty-gray shoulder of a fighter plane . . . one for each Jap plane destroyed . . . these little Jap flags are the favorite decoration of our fighting pilots. And they are appearing regularly. Four of them for every plane of ours that is lost, according to statistics.

U. S. pilots are consistently out-thinking, out-flying, out-gunning the little yellow men. And our planes—the Grummans, the Corsairs, the Cobras, the Lightnings, and the Warhawks—every one of them seems to have proved itself a better all-round fighting plane than the Zero.

We of Bethlehem are proud to say that we've been helping, from the first, in the production of power-plants for these aircraft. Cylinder sleeves, thrust-bearing liners, cams, gears, connecting rods, shafts, counter-weights, spacers, housings, brackets, and dozens of other forgings for fighter-plane and bomber-plane engines. Bethlehem is also making steel for the ammunition used by our aerial fighters. Special steel of "music-wire quality" for machine-gun recoil mechanisms, bullet-core wire for millions of rounds of machine-gun ammunition, and shell-case steel for 20 mm. and 37 mm. aerial cannon. In addition, this company fabricated and erected the steel for many of the factories that now are turning out swarms of fighter planes.

In the air, on the ground, and on the sea, Bethlehem steel is in the fight. Bethlehem facilities are completely, continuously engaged in producing weapons and materials for the world-wide fighting fronts—and in meeting essential needs of the war-production front at home.

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Photo—H. Armstrong Roberts

...is important in your foundry, too!

THE maximum contribution of any foundry toward Victory is the fastest possible production of castings. To aid in that effort we are proud to offer Federal Green Bond, a bentonite whose uniformity of grind guarantees high-speed blending with sand. Regardless of how you mix—from the newest high-speed mullers on down—you can't find a bentonite that will blend more rapidly or more uniformly than Green Bond.

If you use bentonite, in facing, core or molding sand; for magnesium or any other metal—it will pay you to switch to the one bentonite designed for speed:

FEDERAL GREEN BOND

"Best of the Bentonites"

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland, Ohio

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THE FOUNDRY

for JULY 1943

VOLUME 71 NUMBER 7

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NOT TO THE

B. F. HARPEL
Phillipsburg, N. J.

HUMBL
FOUNDRIE
ALSO U
LIN

CLICK

MAY, 1943

Never Too Old To Fight

Life begins at 70 in this barnyard defense plant

"AMERICANS who want to fight needn't be limited by the draft ages. Look at us!" These are the proud words of Benjamin Franklin Harpel of Phillipsburg, N. J. He is his own best illustration, for U. S. Navy subcontractor Harpel is 77 and his staff of one, A. E. Laubach, is 72. They're shown here in midst of AA-1 war production, making aluminum sirens, light indicators, snap switchboxes for fighting ships. Mr. Harpel retired as a manufacturer in 1936. He grew so weary of puttering that in 1940 he converted an old barn and chicken coop into a foundry and returned to work—until priorities stymied him. War manufacturing solved that. Soon he had to hire Mr. Laubach. Though they've never seen their products in action, these septuagenarians must be doing all right, for the Navy gives them all the work they can handle.

HELPER LAUBACH mixes silica sand and lin oil. Packed into core boxes, then baked, the result will be cores for warships' light-indicators and sirens.

USEFULNESS IS NOT MEASURED by years in wartime, as this war plant and its workers prove. The weatherbeaten barn and adjoining chicken coop in a New Jersey town are in the Navy's service as a foundry producing ship fittings. One operator was previously retired, the other unemployed. Both are in their seventies.

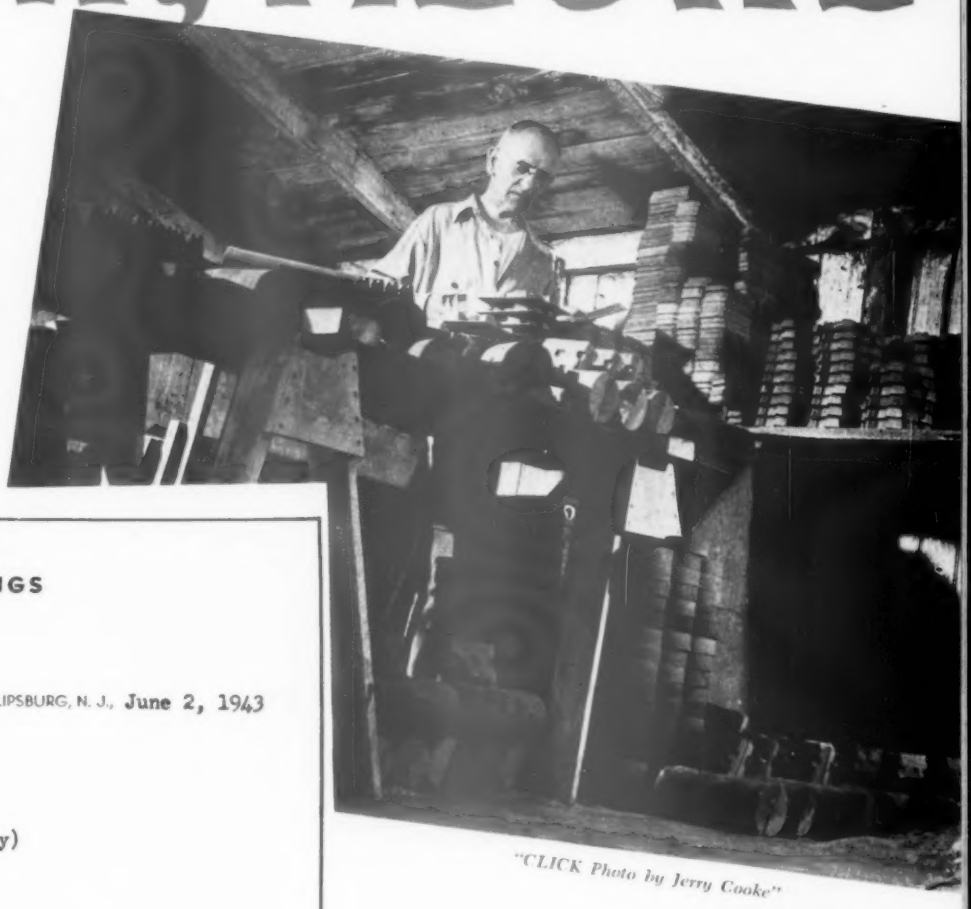
The pictures and text on this page are reproduced from "Click", The National Picture Monthly, by permission of its publishers. Photos by Jerry Cooke.

PROPRIETOR HARPEL pours molten aluminum into molds, in which the cores are placed, as often as eight times daily. He can handle 150-lb. sandbags

THE WERNER CO.
(DIVISION OF ARCHER-
2191 WEST 110 STREET WOODBINE

GREAT, ALONE

THERE are huge production foundries using Linoil by the tankcar, there are those who buy in drums by the lots, and there are those who take a drum or a few gallons at a time. All are our friends and all are truly valued customers. One of the staunchest of Linoil fans is a small foundry in Columbus, Ohio-



"CLICK Photo by Jerry Cooke"

B. F. HARPEL
ALUMINUM CASTINGS
641 BELVIDERE AVENUE

PHILLIPSBURG, N. J., June 2, 1943

THE WERNER G. SMITH COMPANY
(Division of Archer-Daniels-Midland Company)
Cleveland, Ohio

Gentlemen:

Sixty-two years ago I started to serve my apprenticeship as a stove plate molder, so that my association with core oil has been long and varied. When I started my own foundry business thirty-eight years ago I tried different types of core oil and in due time decided that "Linoil" would serve my purpose best. Experience over a long period of years has been such that each time I switched to another brand I always hurried back to "Linoil".

In 1936 I retired but three years ago I started a small aluminum foundry doing all defense work. My helper Abram Laubach is 73 and I am 77. Abe makes the cores very successfully and he too swears by "Linoil". We use a 70 to 1 mix on cores that are intricate and with a record of 99% perfect heats I feel that our cores made up with "Linoil" play a big part in our results.

We are happy that we can do our bit in this ALL OUT WAR and hope we can carry right on through with "Linoil" to Victory.

Yours very truly,

B. F. Harpel

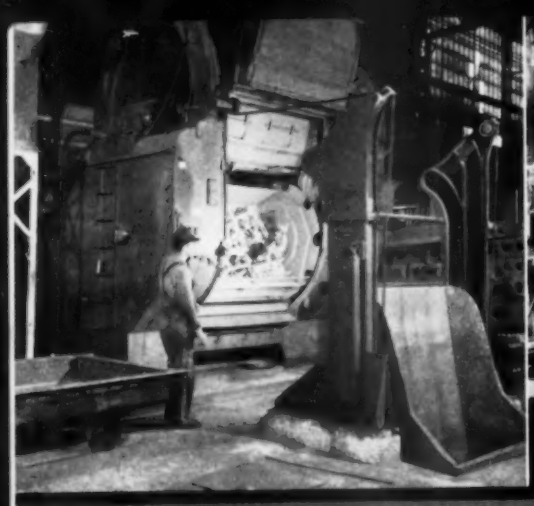
H:K

been using Linoil constantly for over 20 years. He bought his first drum of Linoil in April, 1922. Recently war work has made an added drain on the Linoil drum and last month it went empty. He is now on his second drum of Linoil and reports absolute uniformity. B. F. Harpel uses considerable Linoil as picture above indicates. We are proud that Linoil appeals not to the great foundries alone but to the small and medium also.

SMITH COMPANY

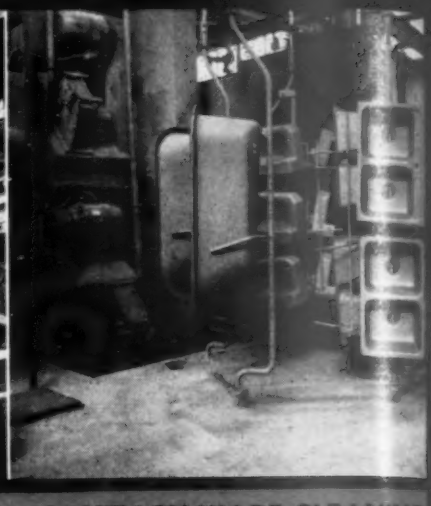
DANIELS - MIDLAND COMPANY)

4690 CLEVELAND, OHIO



ROTOBLAST BARREL

HYDRO CORE-KNOCKOUT



SANITARY WARE CLEANING

YOU
S-P-E-E-D WITH
IN BLAST CLEANING

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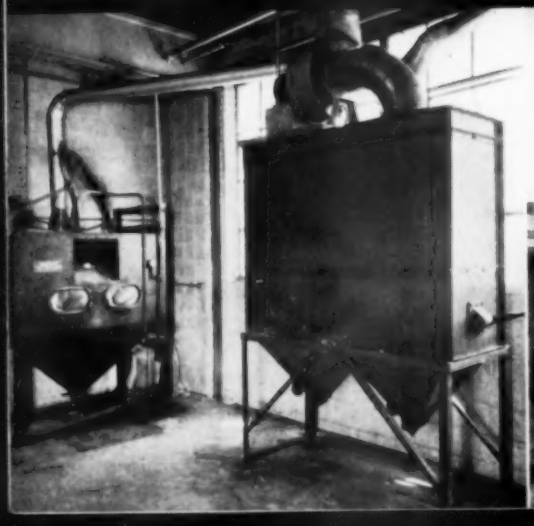
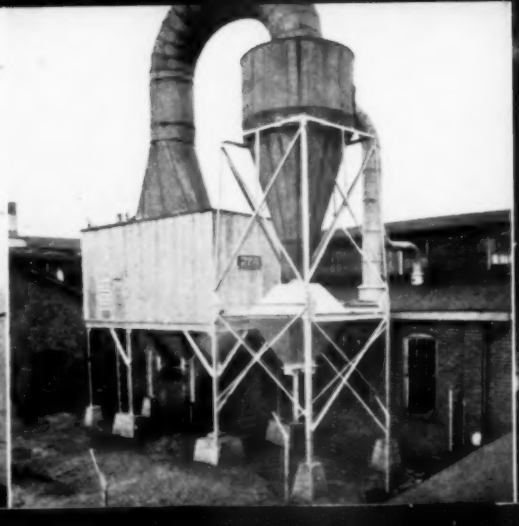
World's Largest Manufacturer of Blast
HAGERSTOWN . . . . . .

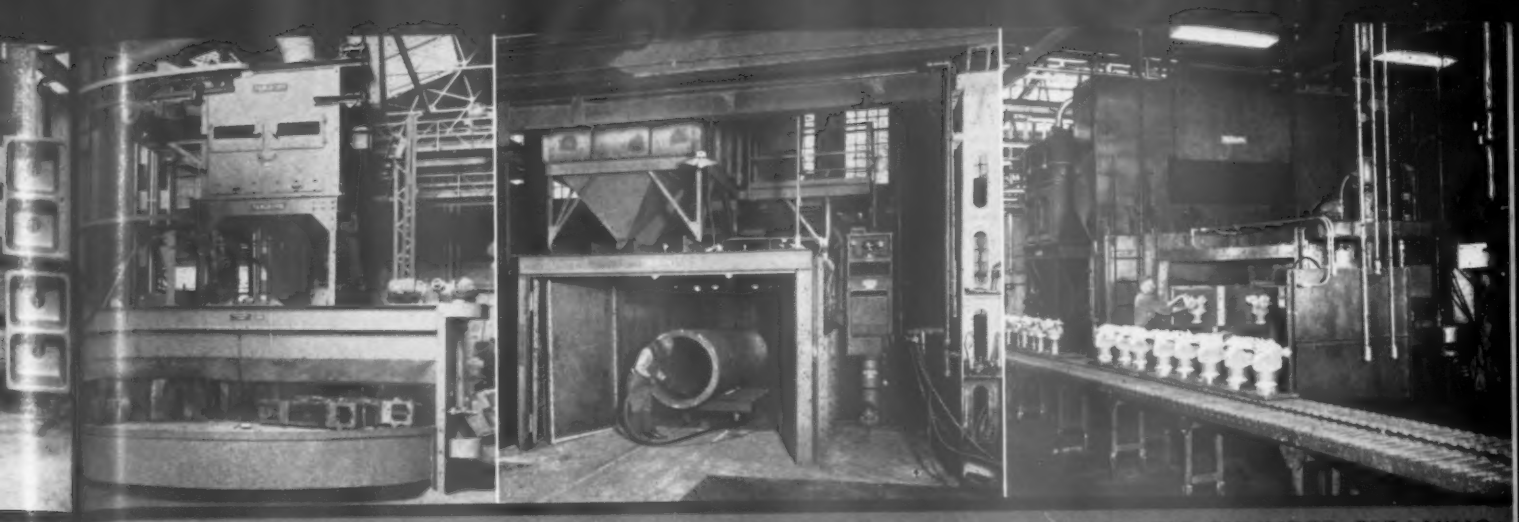
AIR BLAST CABINET



DUST COLLECTOR



ROTOBLAST BARREL



ROTOBLAST TABLE

AIR BLAST ROOM

AUTOMATIC CYLINDER CLEANING

GET EFFICIENCY EQUIPMENT MADE BY BORN

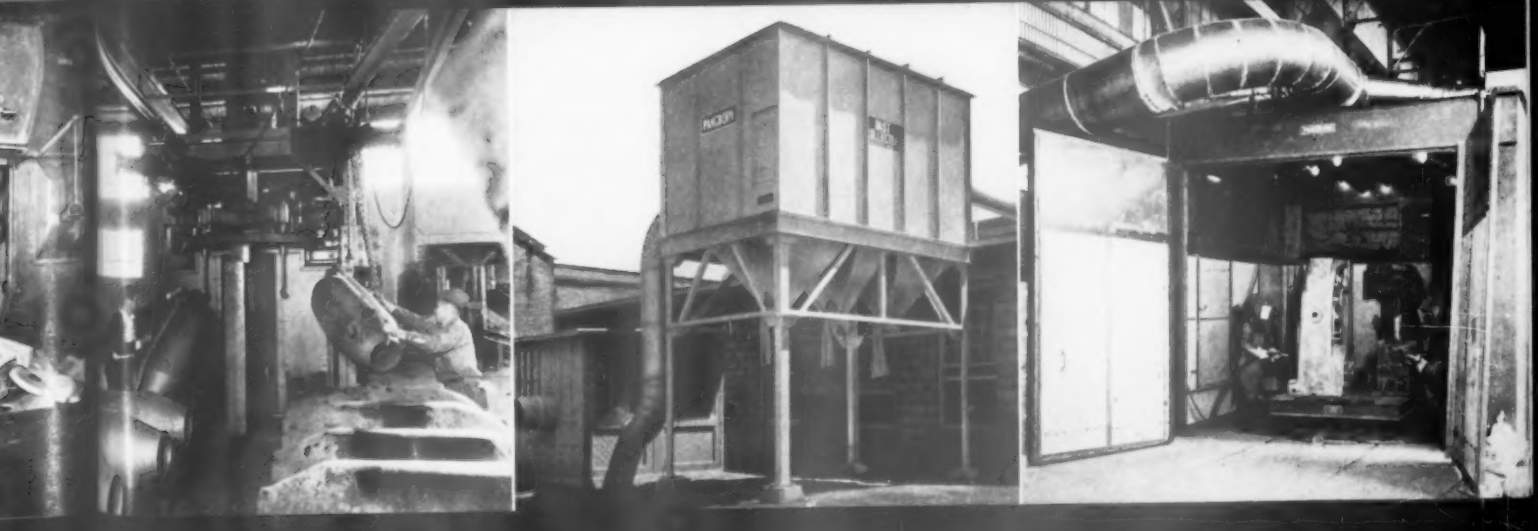
Cleaning and Dust Control Equipment

MARYLAND

AUTOMATIC BOMB CLEANING

DUST COLLECTOR

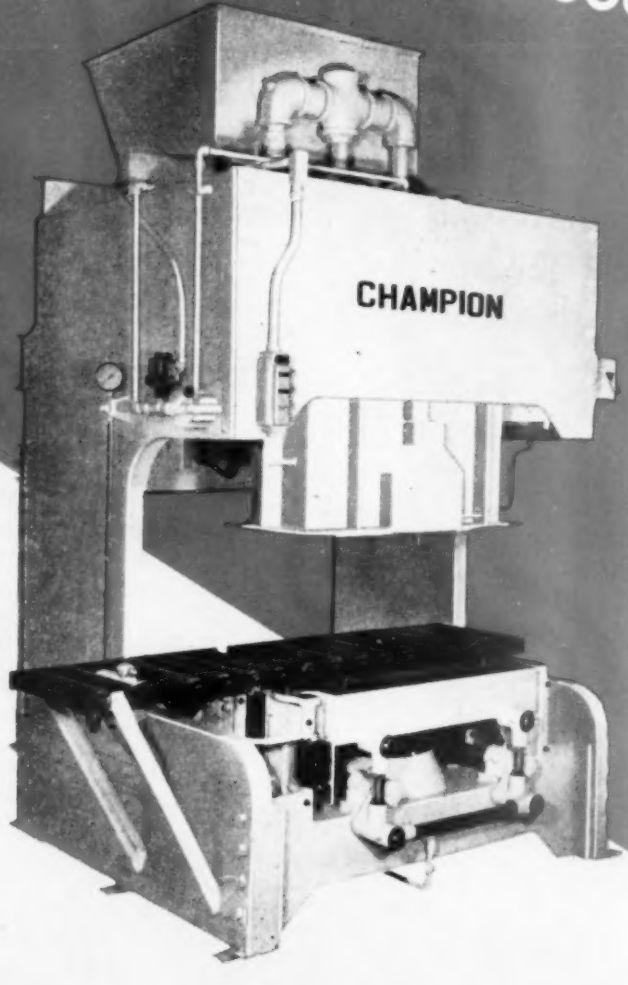
AIR BLAST ROOM



After the War.... What Then?

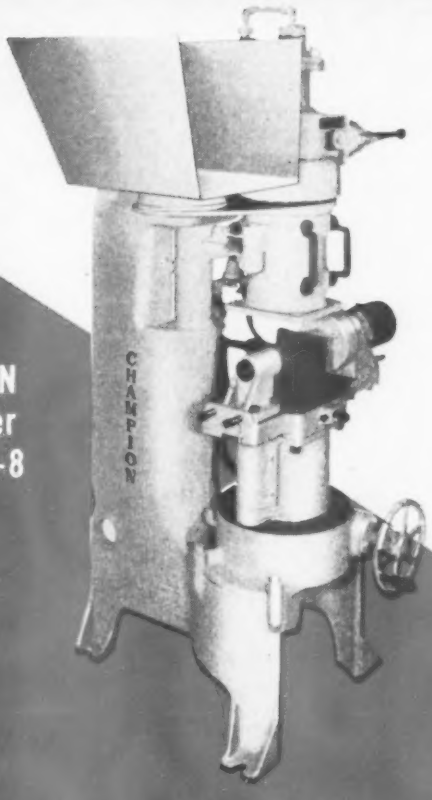
Champion Core Blowe

WILL HELP YOU
MEET COMPETITIO
FOR CONSUMER GOOD



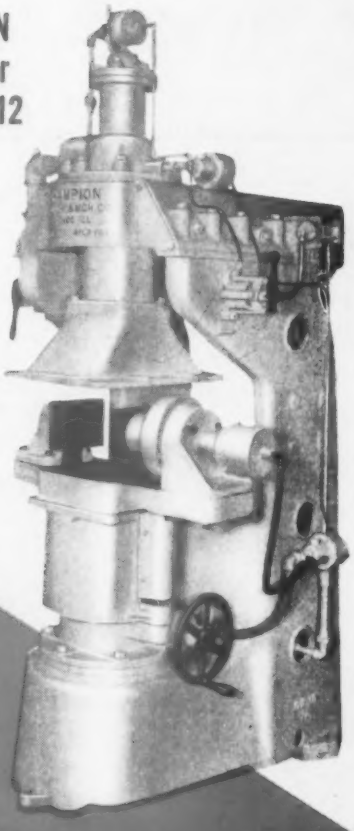
CHAMPION
Core Blower
Model **CB-400**

When you call on Champion engineers to help solve your core making problem, the chances are that their broad experience has equipped them with the answer. For more than 45 years, the Champion Foundry and Machine Company has been building simple, sturdy, efficient, profit-earning equipment for one industry—the foundry. Your inquiries will receive our immediate attention.



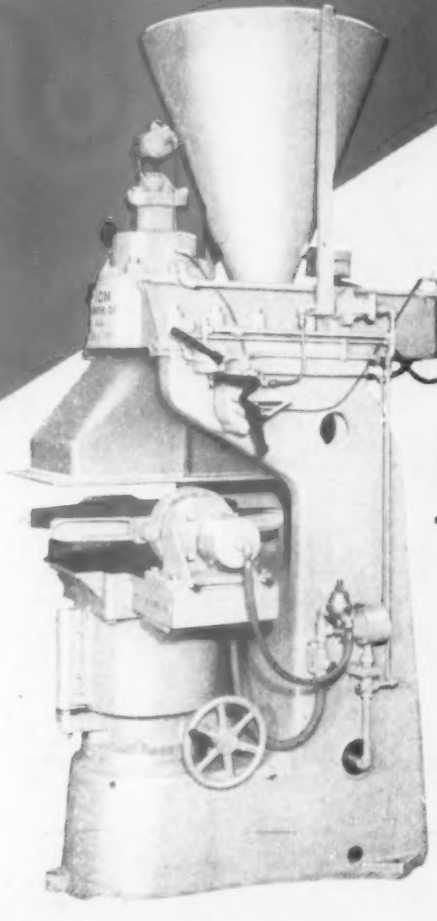
CHAMPION
Core Blower
Model CB-8

CHAMPION
Core Blower
Model CB-12



Hundreds of foundries are earning greater profits today with Champion Core Blowers, and this same modern equipment will continue to serve them well when peace returns and American industry is again producing for use instead of for war. When that great day comes, the problem of rehabilitating servicemen will certainly be industry's problem, and Champion Core Blowers will help to solve it. Any man, woman or child can quickly learn to make the most complex cores with a Champion Core Blower.

Write today for complete information on these modern machines.

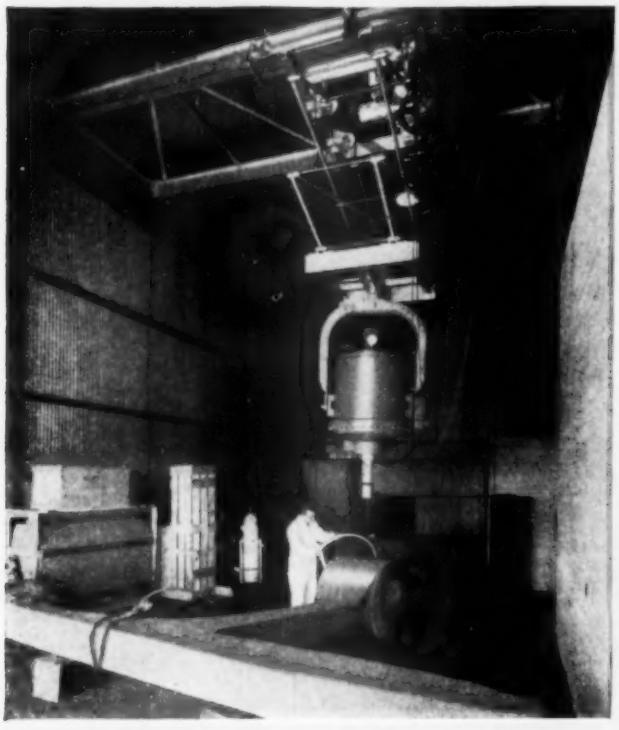


CHAMPION
Core Blower
Model CB-15

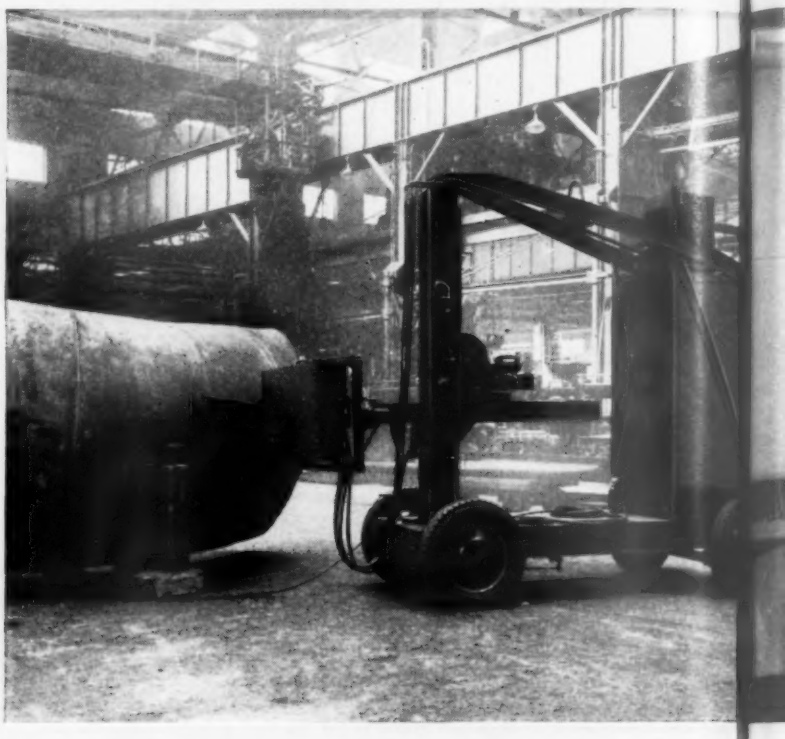
CHAMPION
FOUNDRY & MACHINE CO.

1318 West 21st Street
CHICAGO, ILLINOIS

POWER—G-E Industrial X-Ray Units are available in a full range of power up to and including one-million volts. There's a G-E unit with a capacity to meet every need.



FULL FLEXIBILITY is built into every G-E X-Ray Unit to save valuable operating time and to facilitate accurate positioning for all types of industrial x-ray inspection.



INSPECTION PROBLEMS?

★ If you need x-ray apparatus in your inspection facilities, here's a sound suggestion for a full solution of your problem:

Take advantage of the services of G-E Industrial X-Ray Engineers. They will help you select exactly the right type of G-E equipment to enable you to enjoy fully all of the benefits of x-ray inspection.

You can rely on the recommendations of G-E X-Ray engineers. There will be no guesswork about them because they will be based on the cumulative knowledge gained in more than 20 years' experience in applying x-ray to the inspection problems of more than 500 of the world's leading industrial plants.

STANDARD UNIT DESIGNS are available in four basic types: Stationary Jib Crane, manual or motor-operated jib travel; Mobile Jib Crane; Mobile Units; Overhead Bridge Crane.

Today's Best Buy — U. S. War Bonds

SEMI-AUTOMATIC UNIT provides rapid, accurate production-line x-ray examination of castings or metal assemblies. Convenient control station operates x-ray unit.

BEARING JIG—a new, fast, cost-cutting method for multiple x-ray examination of cylindrical bearings for air-craft, automotive, and Diesel engines.

G-E X-Ray Will Help You Solve 'Em

Shown here are several of the various types available in the complete line of G-E Industrial X-Ray Units. Fast, shockproof, easy-to-operate, they are all designed for heavy-duty industrial service, and you can depend on them to do your job better, faster, and more economically per-unit-inspected.

You can save time, insure production, and protect your x-ray investment by investigating G-E Industrial X-Ray Units. For full information, discuss your problems with a G-E Industrial X-Ray Engineer, or write or wire to General Electric X-Ray Corporation, 2012 Jackson Blvd., Chicago, Illinois. Address Department N37.

NEW, compact, self-contained G-E Industrial Photo-Radiograph Unit inspects small castings for major defects at one-eighth the cost of direct x-ray inspection.

GENERAL ELECTRIC X-RAY CORPORATION

2012 JACKSON BOULEVARD CHICAGO, ILLINOIS

You want top efficiency to solve the problems of today and tomorrow

TODAY, all foundries agree that sand should be mulled to insure uniform, properly conditioned sand. But the important point is this: when you mull your sand *be sure you have the right machine* — there is a difference . . . proved by records and production experience!

Simpson Mixers, engineered and built for today's sand conditioning problems, are the "accepted standard" in most all of the foundries in the United States and Canada for turning out the required tonnage of properly conditioned sand at the lowest cost per net ton. Isn't that the criterion by which to judge in choosing *your* mixer? There are many reasons for choosing a Simpson. Simplicity of design and ruggedness of construction are two principal Simpson features which help assure uninterrupted service — the kind of service you require for the high production of properly prepared sand, using a *minimum* of bonding materials, power, labor and maintenance.

Simpson Intensive Mixers are built in a range of ten sizes to suit every production requirement. They may be equipped with cooling hood or dust cover, various weights of mullers for different classes of sand*, aerators, bucket loaders, liquid batch meters, and automatic timing devices — any auxiliary equipment to fit them for top production efficiency, whether operating as single units or as a part of a large system.

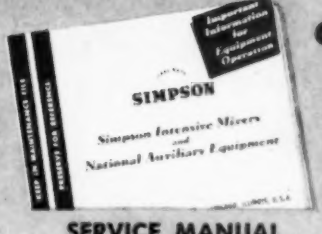
National foundry engineers will assist you in solving any problem in sand handling, conditioning or control. Call on their experience — there is no obligation.

*. . . . *Simpson Mixers do not break down the sand grains!*

NATIONAL ENGINEERING SERVICE . . . on the job to help you!

FIELD SERVICE

National engineers are on the job constantly helping foundries solve problems of sand handling and control on construction, maintenance, repair or new requirements. National Field Service is available and eager to help you whenever and wherever you need it.



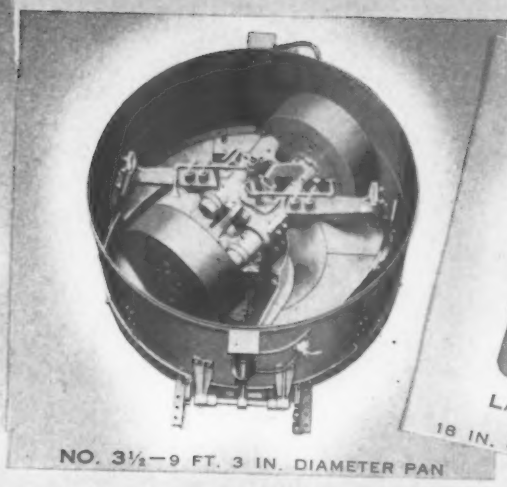
SERVICE MANUAL

This Service Manual is helping keep National Equipment operating at top efficiency. Containing complete installation, maintenance, operating and lubrication details it is on hand wherever National Products are working. Available to all who can use it — it is a part of National's thorough service.

CASTING WEIGHT CALCULATOR

Many thousands of these simple, easy-to-use calculators have been distributed throughout the foundry industry. They help save time and avoid guesswork in estimating castings. If you would like to have one, write us on your company's letterhead. They are free, of course.

NO. 0—8 FT. DIAMETER PAN



NO. 3½—9 FT. 3 IN. DIAMETER PAN

LABORATORY SIZE
18 IN. OR 24 IN. DIAMETER PAN

. . . . there is a

SIMPSON

Intensive

MIXER

to mull your sand properly, at the lowest net-cost-per ton

NO. 1—4 FT. DIAMETER PAN

NO. 2—6 FT. DIAMETER PAN

NO. 1½—4 FT. 8 IN. DIAMETER PAN

NO. 3—8 FT. DIAMETER PAN

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

SIMPSON

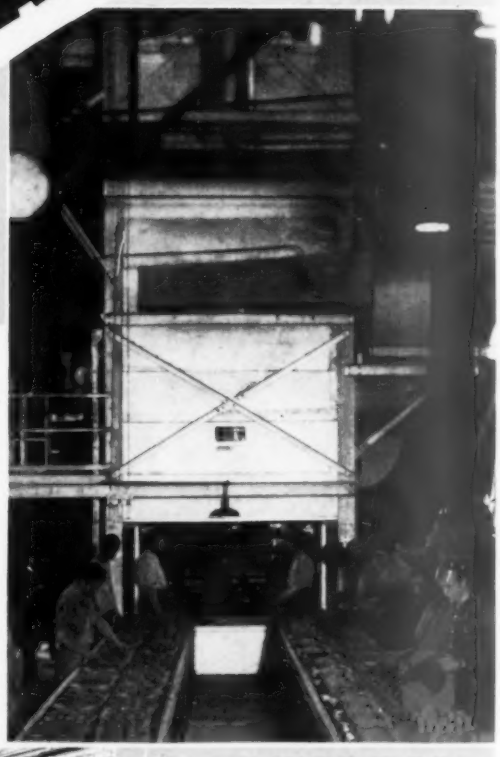
INTENSIVE MIXERS

Built in 10 Sizes

SAVE LABOR!

COLEMAN
TRANSRACK OVENS
for operation with portable racks. Single or multiple rack capacity.

SAVE FUEL!



COLEMAN
TOWER OVENS
for high-speed production, . . . Amazing savings in floor space and production costs.

COLEMAN
ROLLING DRAWER OVENS
for speedy baking of small and medium cores.

COLEMAN CORE AND MOLD OVENS

THE FOUNDRY E
BUILDERS OF COLEMAN AN
CLEVELAND, O

GET MORE PRODUCTION!

...with Coleman Ovens!

PROFIT BY EXPERIENCE GAINED IN OVER 7000 INSTALLATIONS

COLEMAN
CAR TYPE OVENS
for both core baking and mold drying. No job too large.

Save core department man-power by avoiding rejects due to improper core baking.

The right type of oven will further increase core makers' output by removing non-productive operations.

There is a right type and size of Coleman Oven to best meet your particular requirements.

Coleman scientifically controlled heating systems assure not only perfect baking but do this job with substantially less fuel. Perfect results guaranteed with any fuel—gas, oil, stoker-coal, coke or electricity.

If you are faced with a critical oven fuel situation it will pay you to communicate with us at once. Wire or write and we will have an experienced engineer call on you promptly.

RY EQUIPMENT CO.
MAN AND SWARTWOUT OVENS
ND, OHIO, U.S.A.

COLEMAN CORE AND MOLD OVENS

HAYNES *equipment*

BRASS FURNACES

Tilting or stationary. Simple cover lifting mechanism, 2" cold rolled shaft, cast steel cross head, 3/8" rods and turnbuckles for adjusting cover. Made in any size required. 6" machined trunnions rest in chilled face bearings in the legs which are bolted to channel iron base braced with steel bars to eliminate side motion. Gear box and gears adjustable to take up any loose play due to wear. Furnace is complete welded shell equipped with special Haynes burner designed to save nearly one-fourth your oil. Equipped with a General Blower unit.

JOLT SQUEEZER

This machine has a 10" squeeze cylinder, 3" jolt cylinder, 17" x 20" jolt table. Sturdily built throughout—no bolts or screws. Post and jolt cylinder cast in one piece. Arm swings on 2-7/16" cold rolled shaft. Zerk fittings on all moving parts. Comes completely equipped with vibrator, riddle rack, set-off board, air gauge, pop-off gauge and pin for gate horn.

WORM GEAR LADLES

Haynes Worm Gear Ladles are manufactured in all sizes. Welded bowls, cast steel trunnions with "V" bail. Gears completely enclosed. Zerk fittings on all moving parts. Bail is made from 3" x 1" steel.

CORE OVENS

The Haynes Core Oven has 2" insulated walls. Front, top and bottom pressed steel eliminating breakage. Cast iron fire box for Coke, Oil or Gas. Five rolling shelves, one 10" high and four 7" high. Shelves make complete half turn closing oven while shelves are being loaded. Height 51", width 54", greatest depth of shelf 27". Weight approximately 900 lbs. Firebox height 16", depth 15", width 14".

Send for detailed information and prices. Prompt deliveries.

HAYNES FOUNDRY EQUIPMENT CO.

1734 LAKE STREET **KALAMAZOO, MICH.**

HOW TO
BOOST CORE-BAKING OUTPUT WITH REDUCED MANPOWER

Designed to bake *more* cores in *less* time, and with minimum labor and attention, Despatch core ovens today keep far ahead of baking schedules—despite manpower shortages. Even foundries with an 80% labor turn-over have reported above-normal baking production, without sacrificing high quality.

LABOR-SAVING PERFORMANCE ADVANTAGES . . .

By careful engineering and construction of *each* Despatch oven, these labor-saving advantages in operation are assured:

1 **REQUIRES NO EXPERIENCE** in placing load as heat is constant throughout chamber. May be loaded by unskilled workmen. Automatic control of temperature and airflow. Guarantees uniform baking of any well-distributed load.

2 **LOADS AND UNLOADS EASIER,** using most modern and efficient handling systems. All types, to fit any plant. Actually saves labor.

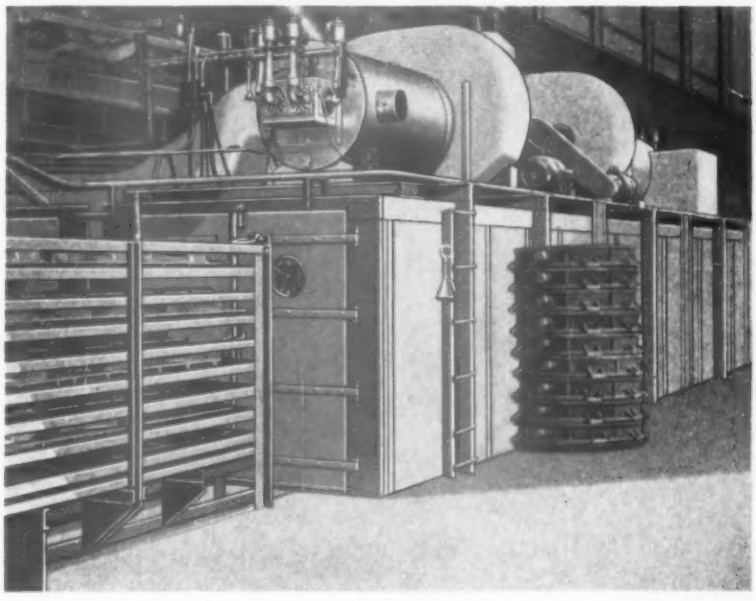
3 **ELIMINATES LOST LABOR** in core-room and foundry by avoiding rejected cores and spoiled castings. A Despatch-baked core is always a properly-baked core.

4 **SAVES EXTRA STEPS** in core-room and uses less floor-space. Ovens are compact and well-designed, have overhead heaters.

5 **NEEDS NO ATTENTION** through entire baking cycle as accurate controls govern heat and movement of conveyor-belts. Won't under-bake or over-bake.

6 **REDUCES WORKMEN'S FATIGUE** by exhausting obnoxious fumes. Heavy insulation and tight-sealing make it easier to work near oven.

PROMPT DELIVERY assured of 63 standard sizes of Despatch core ovens (32 to 640 cu. ft. inside). Types for all ferrous and non-ferrous foundry requirements. Special models readily available. Wire or phone today!



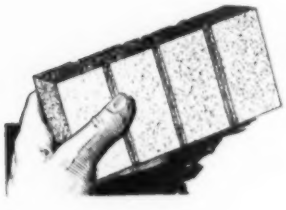
50% LESS TIME is required to bake cores in the 40 ft. chamber of this Despatch intermittent conveyor oven. Bakes cores in 2½ hours instead of 5 hours as before. Easy to load. Completely automatic operation.

SEND FOR FREE BULLETIN 31

which describes and illustrates latest handling systems provided for Despatch cores. Up-to-date information on modern core-baking. Tells how to make best use of your manpower, space and fuel to bake *more* high quality cores.

DESPATCH
OVEN COMPANY MINNEAPOLIS

Photo Courtesy of Cleveland Tramrail Co. Cleveland, O.



with . . . FAMOUS CORNELL FLUXES

for

Brass and Aluminum Castings

there are special Famous Cornell Fluxes, each having definite and exclusive features and advantages.

Manifold improvements invariably follow consistent use of Famous Cornell Cupola Flux.

Time is Saved in Charging. **No messiness. No measuring. Simply add a brick to a ton of metal.**

The Iron is Hotter and More Fluid **due to elimination of slag and other impurities.**

Ladles are Cleaner **in evidence of the purging and purifying action of the flux in the cupola.**

They Get Cleaner Drops **due to the flux glazed surface of the melting zone and fluidity of the slag. Less picking is necessary. Firebrick linings last longer.**

Castings are Denser—More Machineable and more capable of Withstanding Pressure, **even with today's large percentage of scrap.**

And, with all these improvements, Famous Cornell Flux, *costs less,* everything considered, than fluorspar or straight limestone.

WRITE FOR LITERATURE AND PROVE THESE FACTS if not already a user.

The CLEVELAND FLUX Co.

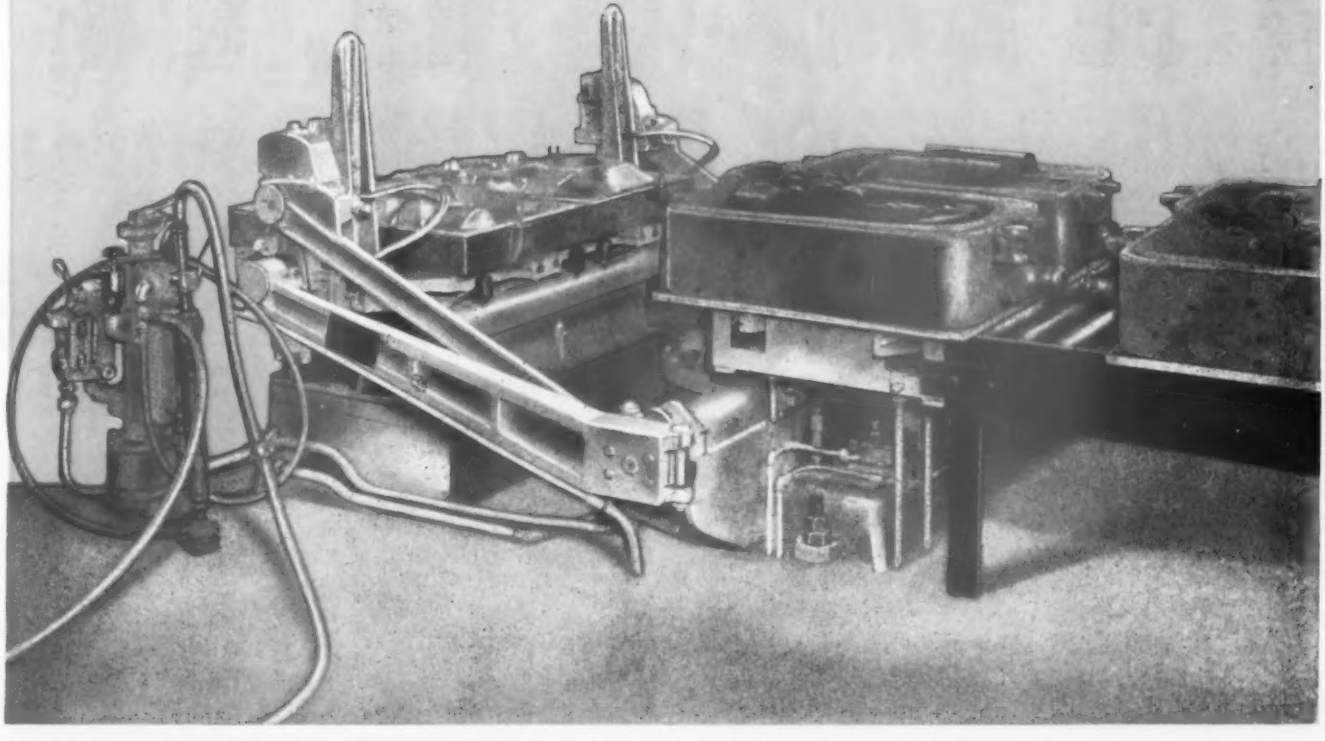
1026-34 Main St., N.W., Cleveland, Ohio

Manufacturers of Iron, Brass and Aluminum Flux Since 1917

HERMAN

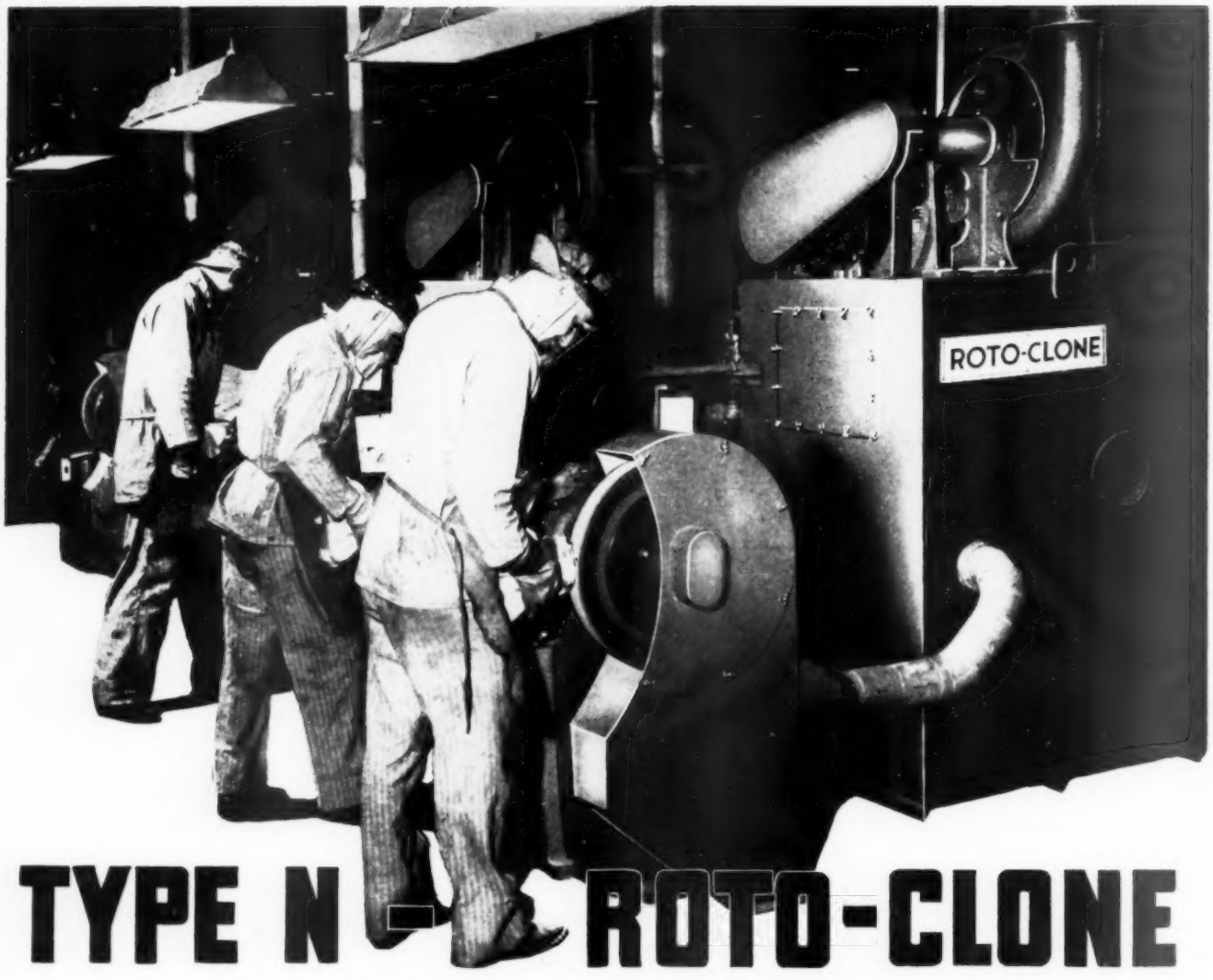
Speeds Molds for Victory

A HERMAN FOR EVERY MOLDING JOB



MOLDING **HERMAN** MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.



TYPE N ROTO-CLONE

provides SAFE POSITIVE control

of magnesium grinding dust

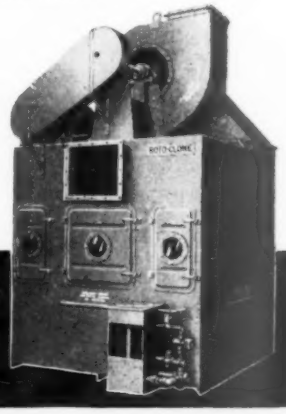
In order to provide absolute safety in the handling of magnesium dusts AAF engineers have developed the Type N Roto-Clone which precipitates the dust under liquid and stores it as sludge.

The Type N is available as a complete self-contained dust collector suited for individual grinding stands, buffers or polishers or in large sizes for serving a central system exhausting from a number of dust sources.

The individual stand Type N Roto-Clone collectors illustrated above exhaust the cleaned air back into the workroom and are now in use in a large mid-western magnesium foundry.

If you have a magnesium dust problem write for Bulletin No. 277 which will be sent without obligation.

Below: Unit Type N Roto-Clone Class 500, size No. 6, 6000 cfm. For service with central system exhausting from a number of dust sources.



BUY WAR BONDS

AAF AMERICAN AIR FILTERS

AMERICAN AIR FILTER CO., INC.
INCORPORATED
266 CENTRAL AVE. LOUISVILLE, KENTUCKY
IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

Properly Conditioned Sand —a "Must" for Good Castings

Royers—a "Must" for Good Sand

Poorly conditioned sand is a prime cause of discounts due to run-outs, drops, surface inclusions and rough finish. And, it's simple to avoid. No chances on losses are taken in thousands of jobbing and production foundries, including many with outstanding war production records, for the Royer has removed the sand preparation problem from the minds of all concerned.

No matter what kind of sand is used, or what its condition or temperature, the Royer Sand Conditioner and Blender turns out velvety, airy sand that makes true-to-pattern molds and greatly reduces discount. The Royer provides sand conditioning that you can't get from riddling or screening. The "thousand fingers" on the Royer's combing belt really open up used sand. They release gases, break up clay balls and remove hard, fused lumps and trash which might pass a screen to spoil a mold. The sand is twice aerated: once on the belt and again at the discharge.

Only the Royer assures this complete six point sand conditioning:

1. *Thorough refuse removal*
2. *Positive lump breaking*
3. *Complete blending and mixing*
4. *Even distribution of moisture*
5. *Increased permeability*
6. *Double aeration*

To meet the needs of every foundry, there's a portable or stationary Royer: capacities up to 50 tons per hour; plus two combination scrap remover models for large jobbing shops. Over *5,000 Royers are now in service.*

Write for full information, including delivery dates on your priority requirements.

Above: Speeding preparation of bench molding sand with a Royer in a large nonferrous foundry. Below: Stationary Royer Model "NRS"; capacity 40 to 50 tons of sand per hour, for use in a continuous sand system.

THE ROYER

ROYER FOUNDRY & MACHINE CO. *KINGSTON, PA.*

This Goggle has what this ladleman needs in all-round COMFORT and PROTECTION

N. F. A. and N. A. S. O. Goggles—now supplied directly to you by American Optical Company—give your foundry workers maximum comfort and safety. Check these features:

COMFORT: The goggles have pliable leather masks . . .wire screen ventilators around the eye-cups. . .AO adjustable one-piece elastic headband that does not catch the hair.

SAFETY: The lenses of these goggles offer the impact-resistance of *Super Armorplate Quality* . . . and can be supplied either clear or calobar glare-resistant.

Ask your AO Safety Representative to show you how these goggles can reduce eye injuries in your foundry.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

Note large thumb screws for starting cope up.

CAST ACCURATE MATCH PLATES- IN THIS ALUMINUM

CROSS SECTIONAL VIEW SHOWING CONSTRUCTION DETAILS

Machined perfectly true and parallel.

Equipped with large thumb screws to start the cope up.

Equipped with double round pins without clearance and without bind. Has adjustments to keep the flask in perfect alignment.

Arranged to permit locating of bars at any position desired.

The weight of the aluminum flask is such that when rammed with sand two men can lift the cope by hand with a perfect sense of feel.

These flasks are built to last a lifetime. They can be stored indefinitely and when wanted are immediately ready for use as they do not warp during storage like wood flasks nor rust like steel flasks.

Remember, a match plate can be no more accurate than the flask in which it was made.

MAKERS OF FOUNDRY FLASKS AND JACKETS Since 1919

HINES FLASK COMPANY

Phone ACademy 1480

1324 HIRD AVENUE • CLEVELAND, OHIO

BRASS INGOTS BRONZE
RIVER RS BRAND
LEAD TIN COPPER
Producers of
BRASS & BRONZE INGOT
SOLDER
BABBITT
PATTERN METAL
Distributors of
INGOT COPPER
PIG TIN
PIG LEAD
The RIVER SMELTING & REFINING CO.
P.O. BOX 5755
CLEVELAND, OHIO
TELEPHONE: FLORIDA 3040

These

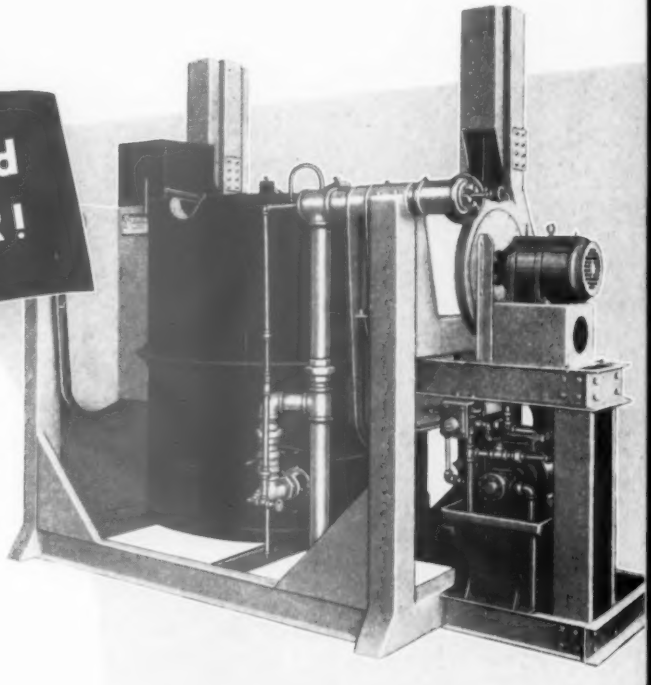
GREAT STROMAN FURNACES

MELT ALUMINUM and MAGNESIUM

FASTER and ECONOMICALLY

Built to handle from 500 to 3000 pounds of aluminum or 350 to 2000 pounds of magnesium per charge, these great furnaces are indeed contributing their bit to the war effort by speeding production, reducing costs and saving metal and man hours. Their rugged but streamlined construction assures longest life, minimum maintenance costs and saves floor space. Fired by either gas or oil with a multiple burner system they guarantee to reduce fuel and power costs to a minimum.

New HYDRAULIC TILT and STATIONARY LIP POUR!



Smooth, gentle, but firm and certain tilting of these superior Stroman Furnaces is completely controlled by the NEW HYDRAULIC LIFTING SYSTEM recently perfected by Stroman. Completely automatic in operation, the operator merely pushed a lever to complete a pour or return the furnace to charging position. VARIABLE SPEED POUR—controlled by simply adjusting a dial valve to desired tilting speed for pouring. Hydraulic Tilt also eliminates sudden jerks, hard stops and swishing starts and assures pouring of being under positive and instant control always. It is fool-proof in operation . . . simplifies operation and minimizes spillage. Stroman Hydraulic Lift is the SAFEST manner of tilting furnaces . . . for there is nothing to break, and furnace will return to melting position slowly in case of power failure.

THE FAMOUS STATIONARY LIP POUR which allows the furnace to maintain a constant pouring arc during the entire pour, without the necessity of moving the ladle, is another great Stroman time and metal saving feature.

These furnaces now performing Herculean tasks in many leading foundries are the answer to your melting problems. Let our engineers consult with you and point out the many savings and advantages that may be effected with their installation.

Write for full information of all types of non-ferrous metals for Brass, Bronze, Aluminum, Magnesium and all other types of non-ferrous metals. These furnaces are available for immediate delivery in all sizes . . . from the largest to the smallest.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO

THERE IS A CORRECT WAY

The SPEEDSLINGER Way

Rams 1,000,000 Pounds of Sand in 8 Hours at a Cost of 3 Tenths of One Cent per Cubic Foot, Including Operator's Wages

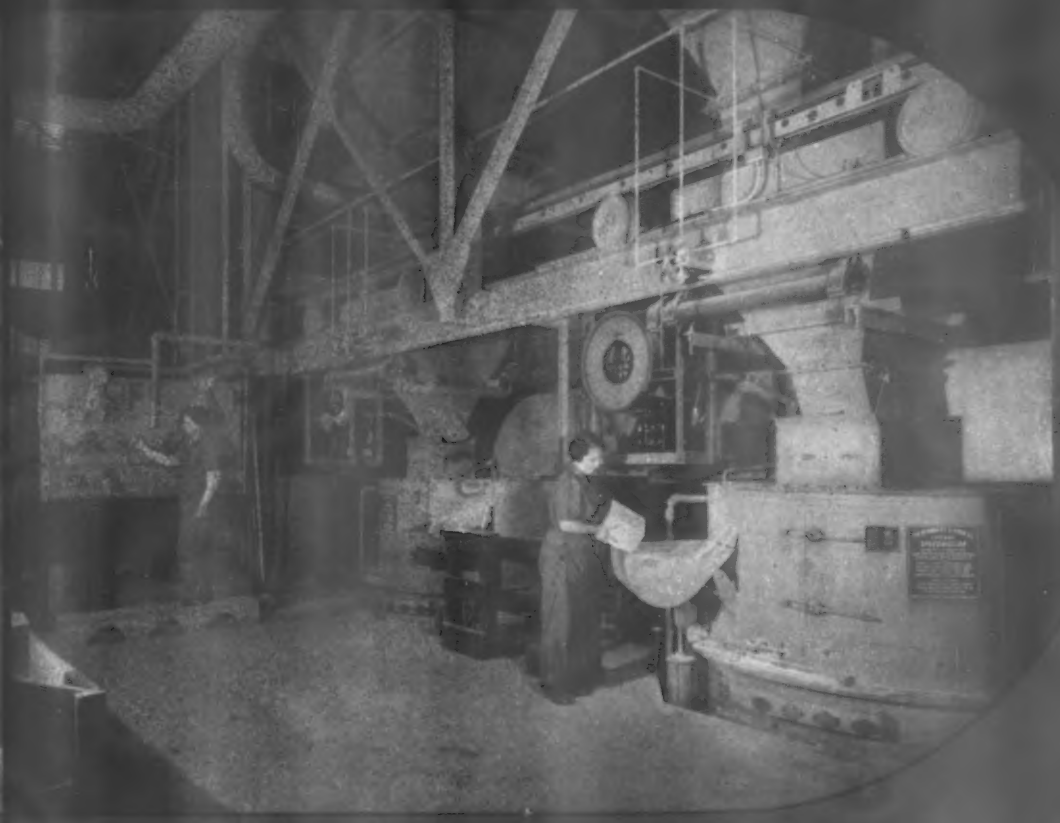
When a steel jobbing foundry was commissioned to make tank hulls, their hand-ramming production was one tank hull in 8 hours from one pattern. With the *Speedslinger* they have stepped up production to 7 tank hulls in 6 hours from one pattern and the same floor space.

Speedslinger Saves $578.31 Ramming Cost on 7 Tank Hulls

Cubic feet in each mold	1073 cubic feet
Hand filling and ramming labor cost	.08 per cubic foot
Total filling and ramming labor cost per mold	$85.84
	7
Total filling and ramming labor cost for 7 molds	$600.88
Speedslinger filling and ramming cost for 7 molds	$ 22.54
Speedslinger labor savings on 7 tank hull molds	$578.31

THE BEARDSLEY &

...y to Do Everything ★ ★ ★



The SPEEDMULLOR Way

Mulls, Removes Fines, Aerates, Squeezes,
Agitates and Cools Hot Sand

The *Speedmullor* is sensationally faster because all the sand is squeezed, agitated and aerated in suspension on the side wall of the bowl where there is no speed limit. Plows constantly toss, tumble, and agitate, and the wheel squeezes the sand while it is in suspension. The mulling and bonding action takes place within the sand itself because the sand does not slip on the rubber surfaces.

In a small Eastern steel jobbing foundry, the sand was exceptionally hot before the *Speedmullor* was installed. Today, this sand is cooled to 5 degrees above room temperature during a 1½-minute *Speedmullor* mulling cycle. They say: "Had the *Speedmullor* not been available, and had it been necessary to install a less efficient machine, we were planning to construct an addition to our shop, because our sand was too hot to use without cooling. The *Speedmullor's* incomparable efficiency solved our hot sand problem and gives us an ample supply of correctly mulled sand at all times."

★ ★ ★

METALLURGICAL TESTING

with speed and accuracy

● Specimen Polisher; vibrationless operation; selective speeds; sturdy construction, with maximum comfort and convenience in operation.

● Bakelite and Transoptic mounts made in AB specimen mount press.

● AB Multiple-Unit polishing table—for industrial production laboratories. Ample room is provided for each operator. May be supplied with either standard or low speed polishers.

● Wide field binocular. Stereoscopic vision from 7X to 40X and up.

● AB Specimen Mount press—with solid heater and new design split cooling blocks that swing into position without releasing pressure on the mold. Built for speed, convenience and accuracy in molding specimens.

A complete line of equipment for the Metallurgical Laboratory

SPECIMEN MOUNT PRESSES — POLISHERS — POLISHING ABRASIVES — POLISHING CLOTHS — POWER GRINDERS — BELT SURFACERS — CUT-OFF MACHINES — HAND GRINDERS — CARBON METERS — COLORIMETERS — HARDNESS TESTERS — DUST COUNTERS — DILATOMETERS — EMERY PAPER GRINDERS — LABORATORY CHAIRS TITRATORS — MAGNIFIERS — METALLOGRAPHS — MICROSCOPES — STEREOSCOPES PYROMETERS — REFRACTOMETERS — SPECTROGRAPHS — MACRO CAMERAS

Adolph I. Buehler

OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS

228 North LaSalle Street, Chicago, Illinois

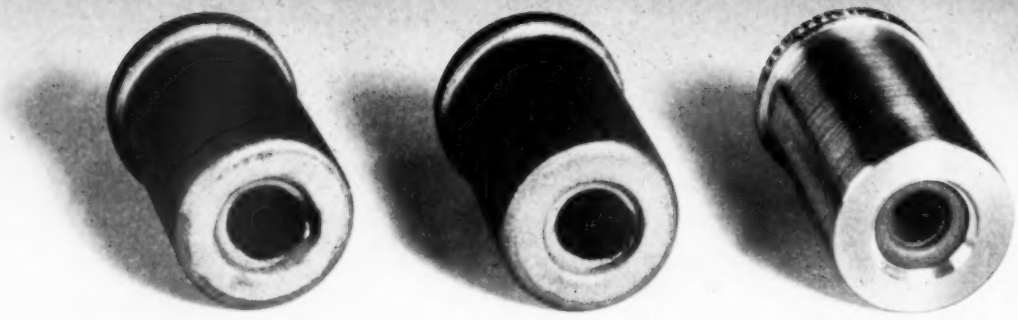
SWINDELL

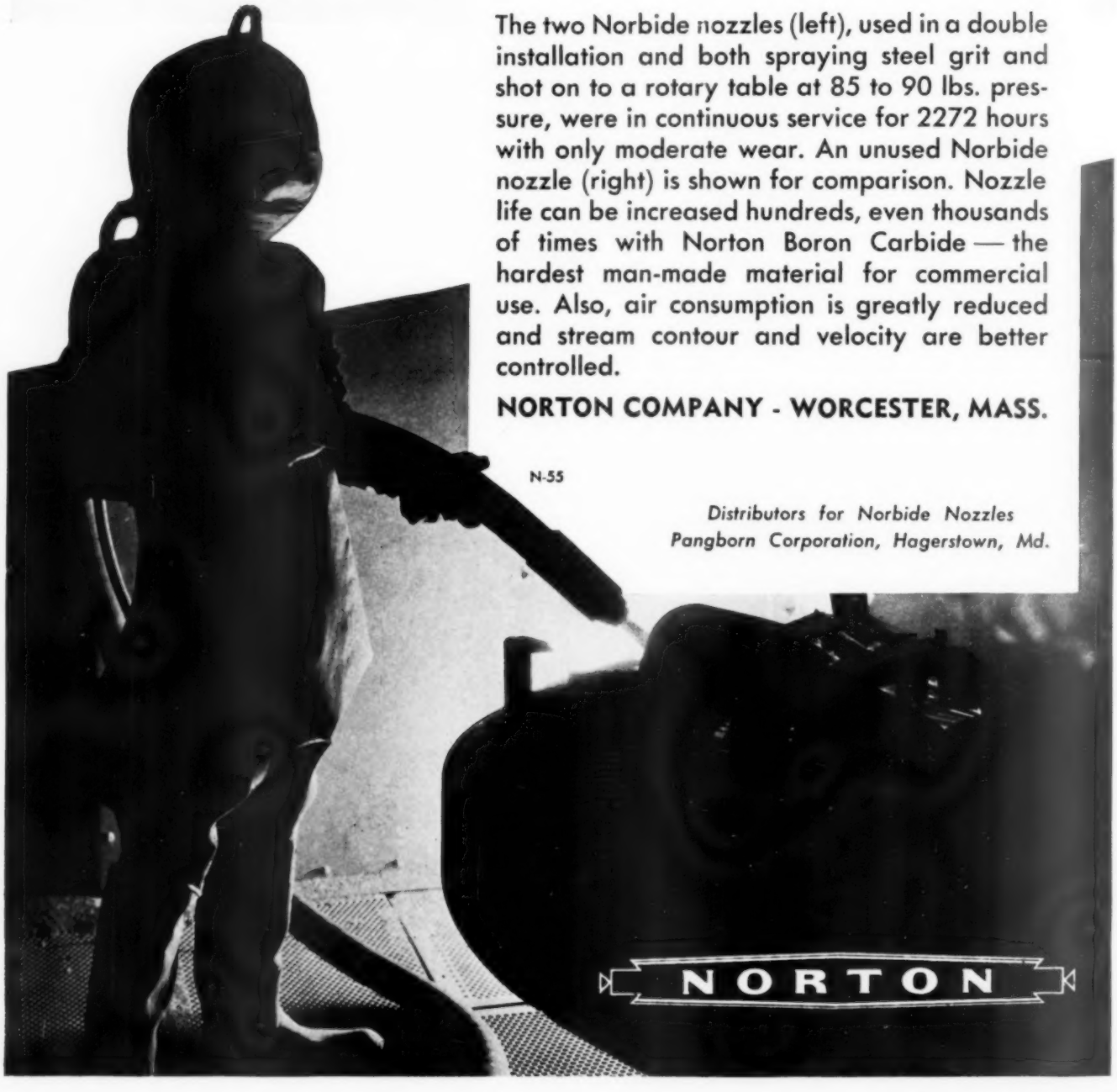
ELECTRIC ARC MELTING FURNACES

DOING A TOP-CAPACITY JOB
IN TODAY'S
VITAL WAR PRODUCTION

SWINDELL-DRESSLER Corporation
DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES
PITTSBURGH, PA.

2,272 HOURS . . . with NORBIDE NOZZLES





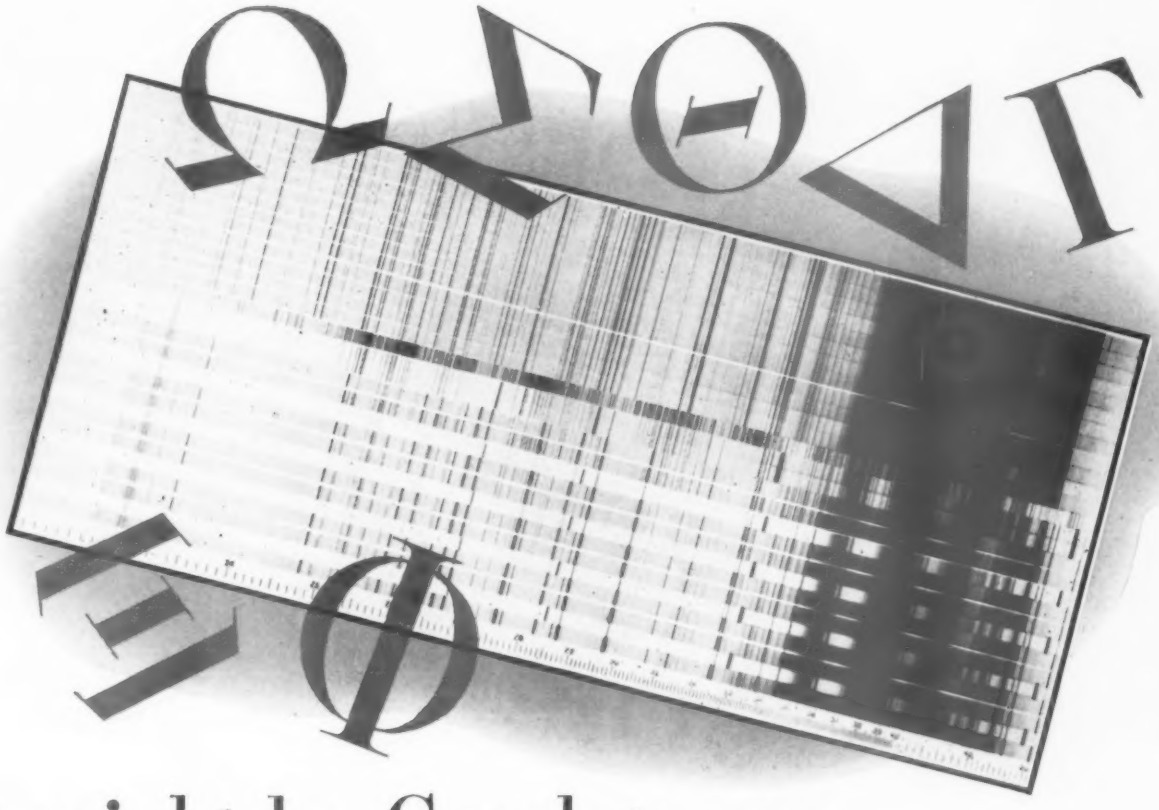
The two Norbide nozzles (left), used in a double installation and both spraying steel grit and shot on to a rotary table at 85 to 90 lbs. pressure, were in continuous service for 2272 hours with only moderate wear. An unused Norbide nozzle (right) is shown for comparison. Nozzle life can be increased hundreds, even thousands of times with Norton Boron Carbide — the hardest man-made material for commercial use. Also, air consumption is greatly reduced and stream contour and velocity are better controlled.

NORTON COMPANY - WORCESTER, MASS.

N-55

Distributors for Norbide Nozzles
Pangborn Corporation, Hagerstown, Md.

NORTON



It might be Greek to you —

Yes, the Spectrogram above might very well be Greek to you. But it is a highly indispensable and invaluable part of the system of controls used by Michigan Smelting technicians in developing non-ferrous alloys to precision specifications. The spectro lines identify the various elements contained in the alloy. By rapid mathematical evaluation of the spectro lines, our metallurgists are able to accurately determine the composition of each heat while it is still in the furnace. The speed of this method enables them to control the composition of the molten metal to meet exacting specifications before the casting of the ingots.

Michigan Smelting
and Refining

DIVISION OF

BOHN ALUMINUM & BRASS CORPORATION

DETROIT, MICHIGAN

General Offices: Lafayette Building

FOR VICTORY
BUY UNITED STATES
WAR SAVINGS
BONDS & STAMPS

50 YEARS OF KNOW-HOW

IRONTON CARO-LINE

A Monolithic Lining for...

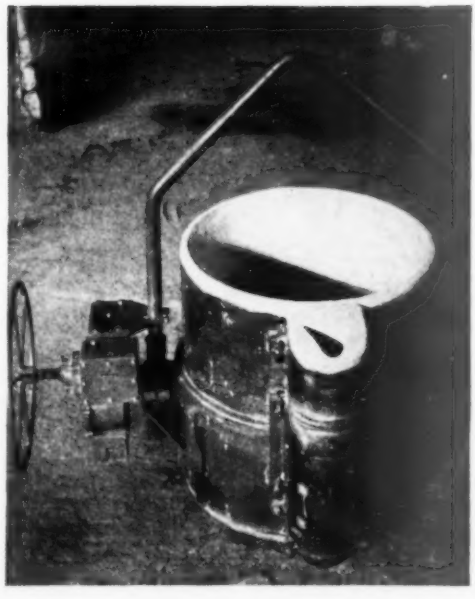
LADLES OF ALL SIZES
SIDE BLOW CONVERTERS, ACID ELECTRIC FURNACE BOTTOMS, CUPOLA BREAST AND SLAG HOLES . . . . .

"Ironton Caro-Line" is giving unusually good service in some of the most carefully operated foundries in this country and Canada. This siliceous ramming refractory is being used successfully in ladles handling electric furnace steel, open hearth steel, alloy irons, malleable iron and gray iron.

Steel foundries using "Ironton Caro-Line" have noticed a considerable reduction in the loss of castings due to slag inclusions. This is due to the high refractoriness of this product and its great resistance to iron and manganese oxides.

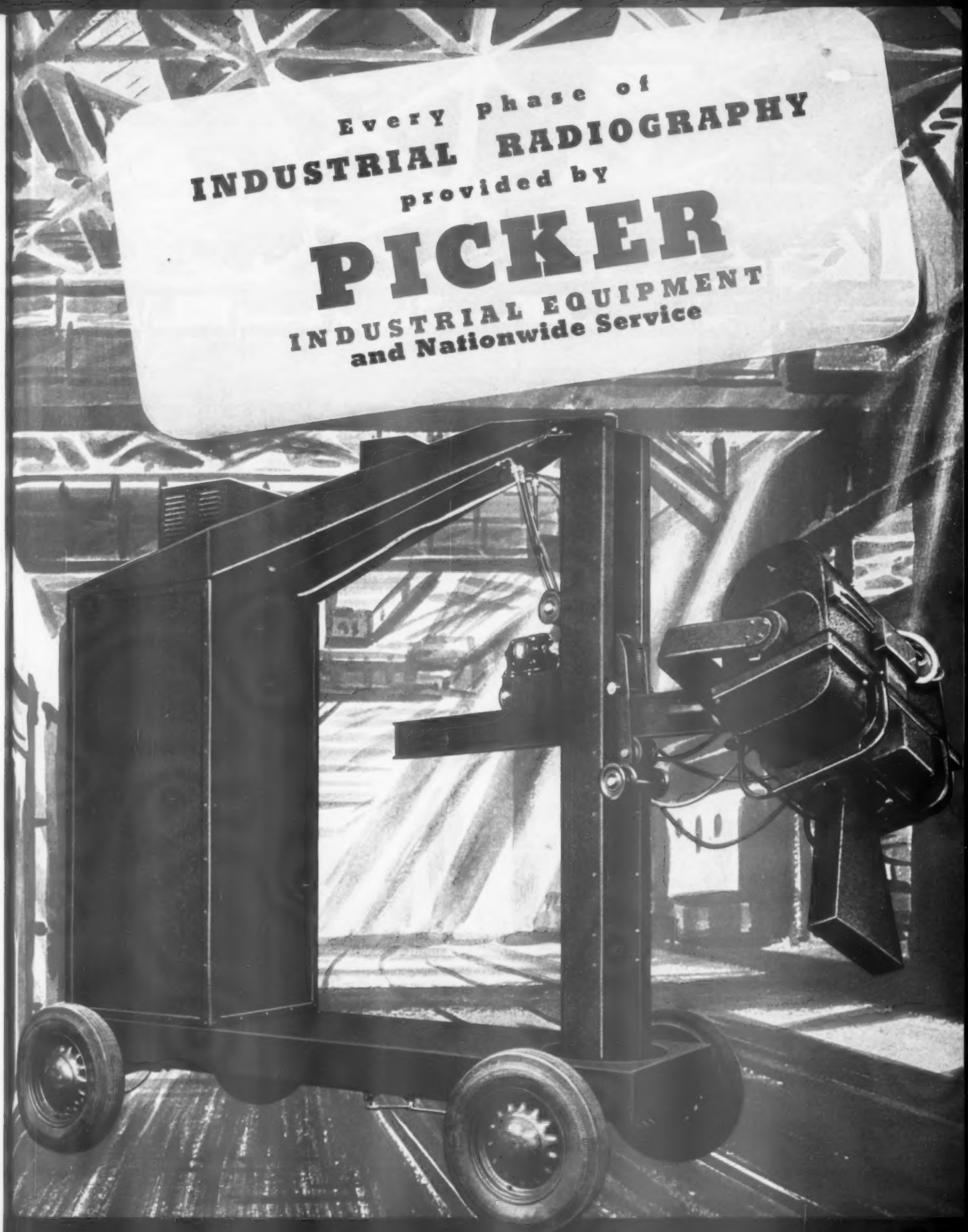
It is much easier to install than ganister-clay mixtures and gives a much more solid, less permeable lining.

Ask us for complete information on "Ironton Caro-Line".



Address Box 209

THE IRONTON FIRE BRICK COMPANY
RELIABLE REFRACTORIES
IRONTON OHIO



PICKER X-RAY CORPORATION

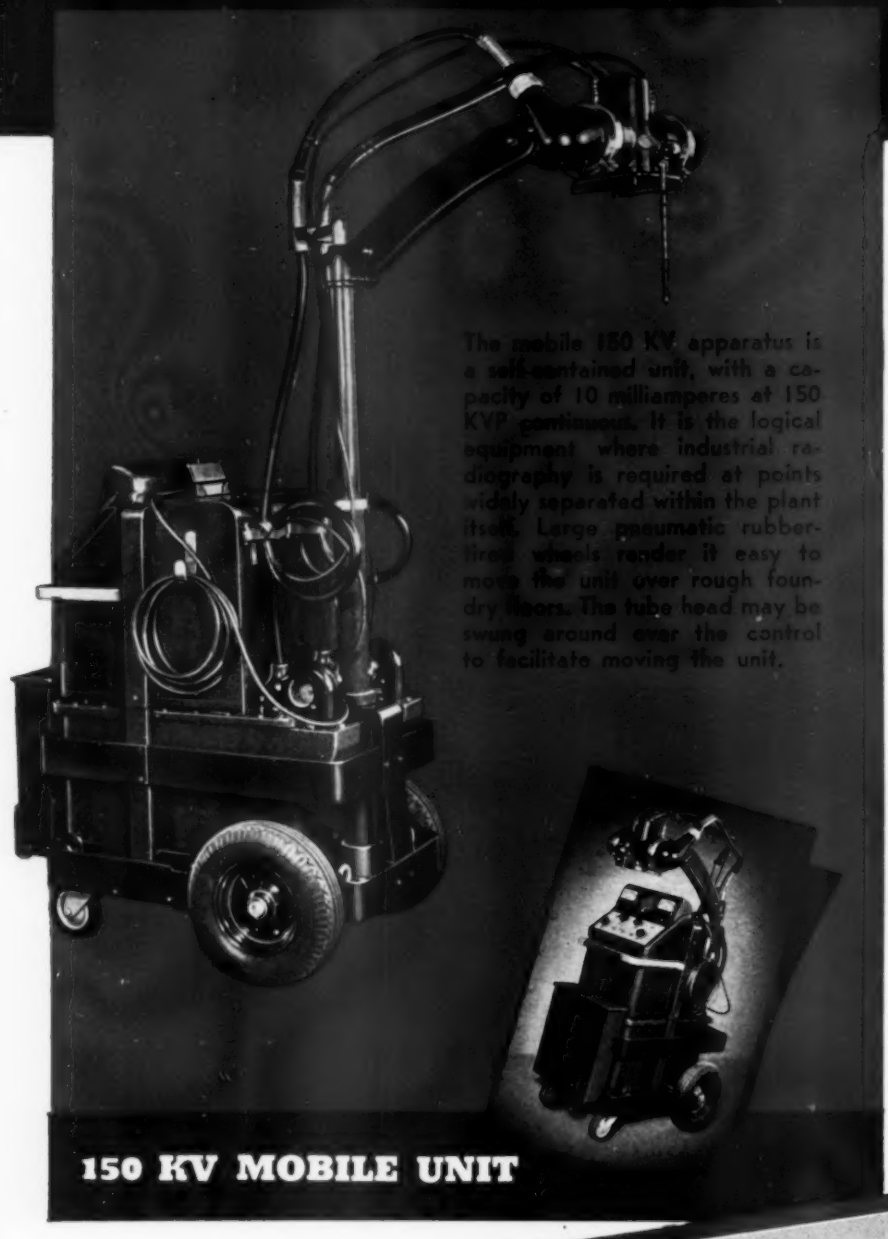
Waite Manufacturing Division — Cleveland, Ohio

300 Fourth Avenue • New York 10, N. Y.

Manufacturers of the U. S. Army X-Ray Field Equipment

First "E" Awarded to the X-Ray Industry August 1, 1942

INDUSTRIAL



The mobile 150 KV apparatus is a self-contained unit, with a capacity of 10 milliamperes at 150 KVP continuous. It is the logical equipment where industrial radiography is required at points widely separated within the plant itself. Large pneumatic rubber-tired wheels render it easy to move the unit over rough foundry floors. The tube head may be swung around over the control to facilitate moving the unit.

150 KV MOBILE UNIT

This unit with its flexible tube stand and wide range of power occupies a minimum of floor space. The tube head may be moved over considerable vertical and lateral range, or, may remain stationary for continuous radiography of articles on a conveyor system.

150 KV STATIONARY UNIT

AIR FLOW PORTABLE

The Air Flow Portable Unit—with a capacity of 80 KVP and 15 MA, while primarily intended as a laboratory and research apparatus, may be used for production inspection of small objects of light metal, plastic or other materials of low density. It has a fairly wide application in the aluminum and magnesium industries, for testing of pilot castings and for spot checking. At 5 MA and 80 KVP, the Air Flow Unit has a high percentage operating cycle reducing the cooling period to a minimum.

Picker

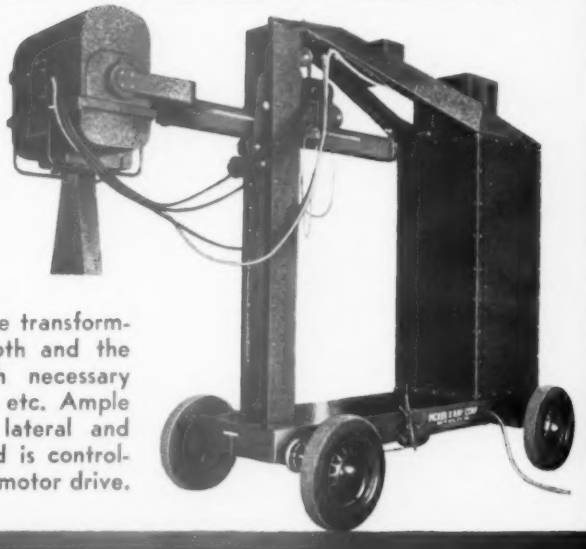
MANUFACTURERS

X-RAY APPARATUS

Picker Industrial Units are conservatively rated for continuous duty. They cover a broad section of the field in which the value of x-ray inspection has been proven. The transformers and controls have been designed with a view to adapting them to a variety of mountings — thus extending their usefulness over a wide range.

250KV UNIT DOLLY MOUNTED

The self-contained 250 KV Transformer - tubehead on trunnions may be mounted on a dolly travelling on rails. The transformer - tubehead can be angulated through 180°. This dolly-mounted unit is particularly useful for radiographing long lengths of welded steel pipe, pressure vessels or similar heavy products difficult to move from the plant floor.



This self-contained 250 KV Industrial Unit has found very wide application in a great variety of metal industries. The truck carries the transformer-tubehead, control booth and the operator, together with necessary cassettes, stock of films, etc. Ample range of motion—both lateral and vertical—in the tubehead is controlled either manually or by motor drive.

250 KV MOBILE UNIT

PICKER X-RAY DIFFRACTION EQUIPMENT

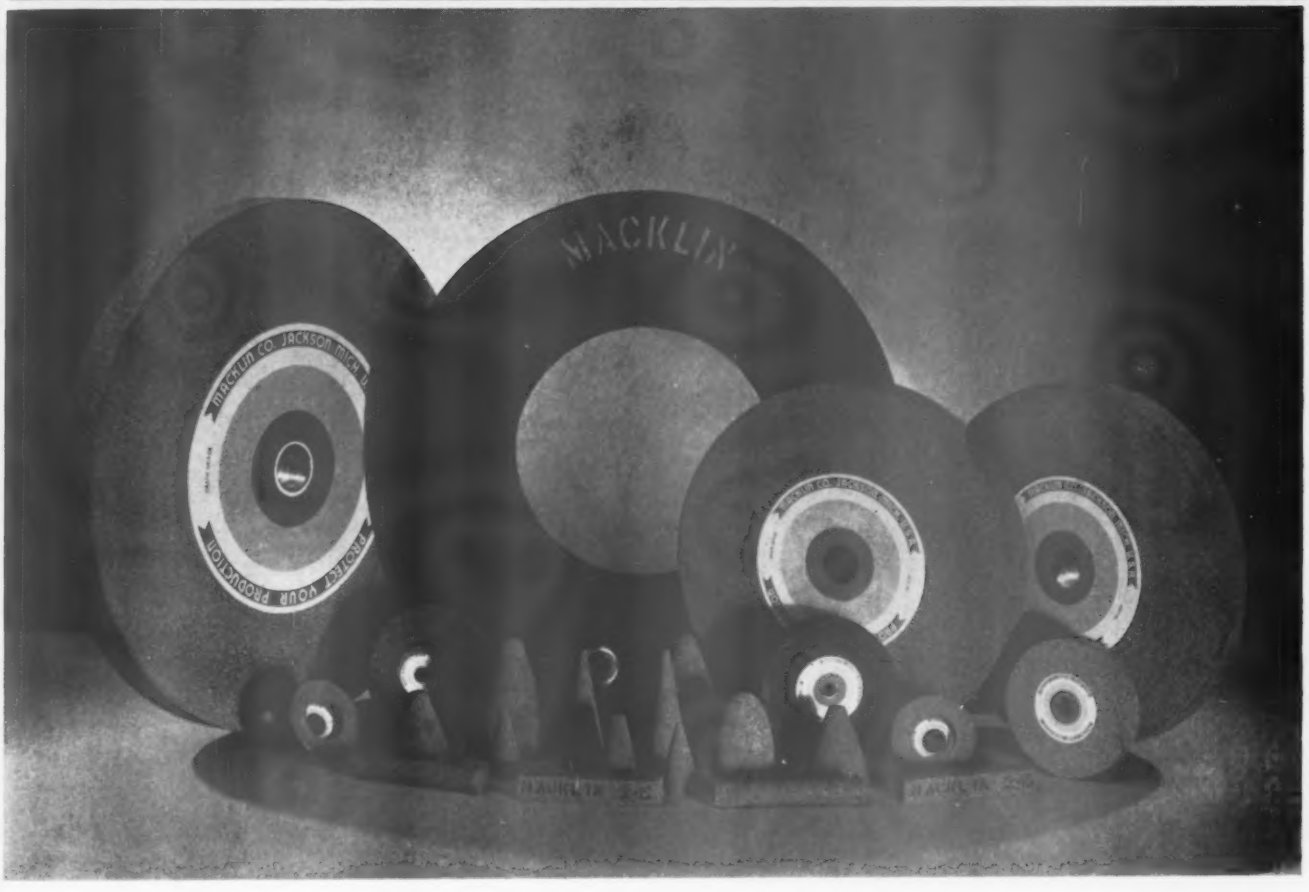
The Picker X-Ray Diffraction Equipment has been designed to meet the increasing demand for application of X-Ray Diffraction methods to research and industrial problems. It embodies several new and unique features which satisfy the most rigorous demands of precision and industrial research without in the least sacrificing any necessary requirements for safety, compactness, ease of operation and adaptability. This equipment consists of the Picker-Waite X-Ray Diffraction Unit, x-ray diffraction tubes (which are available with copper, cobalt, iron, and molybdenum targets) and four types of diffraction cameras.

X-Ray
CORPORATION

OF HIGH VOLTAGE ELECTRICAL APPARATUS SINCE 1879

PX
ACCESSORIES
designed for
INDUSTRIAL RADIOGRAPHY
CLEARMIX
MEDICAL
X-RAY
DEVELOPER
CONCENTRATED
PERFIX
INDUSTRIAL
X-RAY
FIXER
CONCENTRATED
REPLENISHER
FOR
INDUSTRIAL
CLEARMIX
X-RAY DEVELOPER
PICKER X-RAY CORPORATION
PX
PICKER X-RAY CORPORATION
Printed in U.S.A.

MACKLIN
Grinding Wheels



FOUNDRIES, large and small, require grinding wheels in many sizes, shape, grains and grade combinations.

Macklin Company is thoroughly equipped to produce high quality grinding wheels for all foundry requirements.

No matter what your grinding problems may be there is a Macklin wheel to fit the job that will "Protect Your Production."

Ask for the services of a Macklin Field Engineer.

Invest in War Bonds

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS—JACKSON, MICHIGAN, U. S. A.

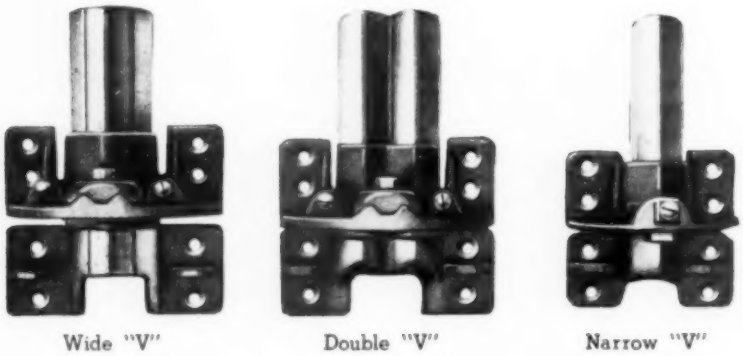
Distributors in all principal cities

Sales Offices:—Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

Adams Cherry Slip Flasks

These flasks are made to your specifications, with any desired length, width or depth. Material is close-grained cherry lumber, with machined malleable trimmings.

The sand strip mechanism is convenient and quick-acting and it will stand up under the squeezing and jolting of power machines. For greatest efficiency, try the Adams Cherry Slip Flask in combination with Adams Jackets.



Wide "V" Double "V" Narrow "V"

Pins to Suit Your Preference

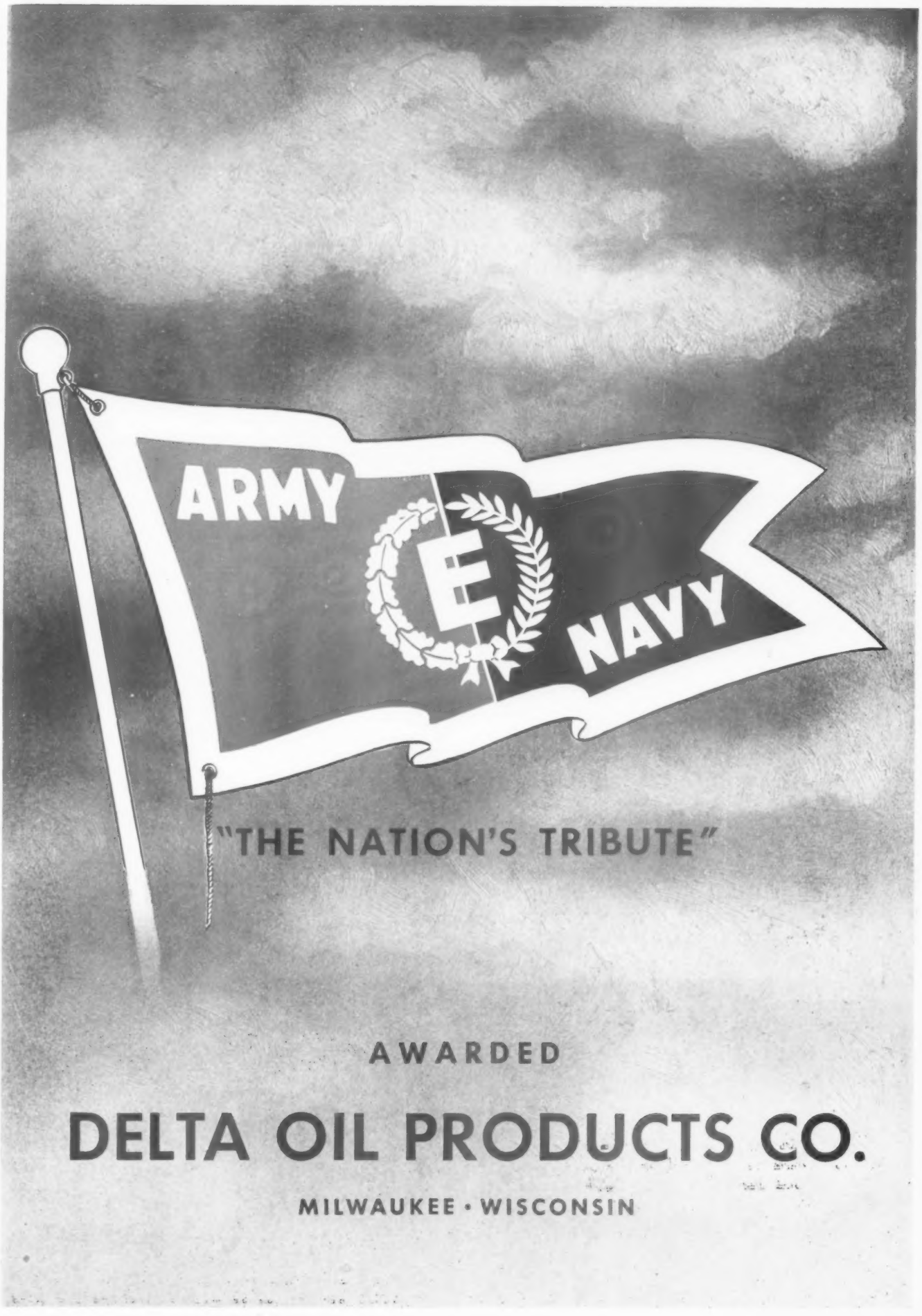
Wide-V pins are furnished unless otherwise specified. We can supply double-V, narrow-V, round or other styles of pins to conform with your present pattern plates.

The Adams Company

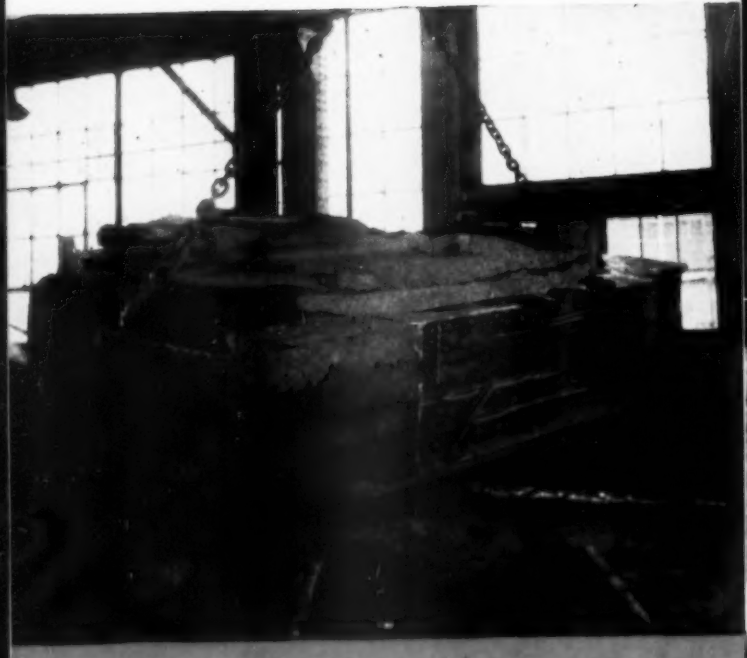
1883—Our 60th Year—1943

800 Foster St., Dubuque, Iowa

MOLDING MACHINES **ADAMS** **FLASK EQUIPMENT**


ARMY
E
NAVY
"THE NATION'S TRIBUTE"
AWARDED
DELTA OIL PRODUCTS CO.
MILWAUKEE • WISCONSIN

LOOK ON YOUR FOUNDRY FLOOR



This machine tool casting is on its way to the Hydro-Blast room where the cores will be knocked out and surfaces cleaned to a satiny finish.

This pile of sand which originally cost more than $3.00 per ton can be washed, classified and dried by Hydro-Blast for 70 cents per ton.

There you will see a fortune in used core and molding sand, recoverable by the Hydro-Blast system which is already relieving our overtaxed transportation facilities from hauling millions of tons of foundry sand.

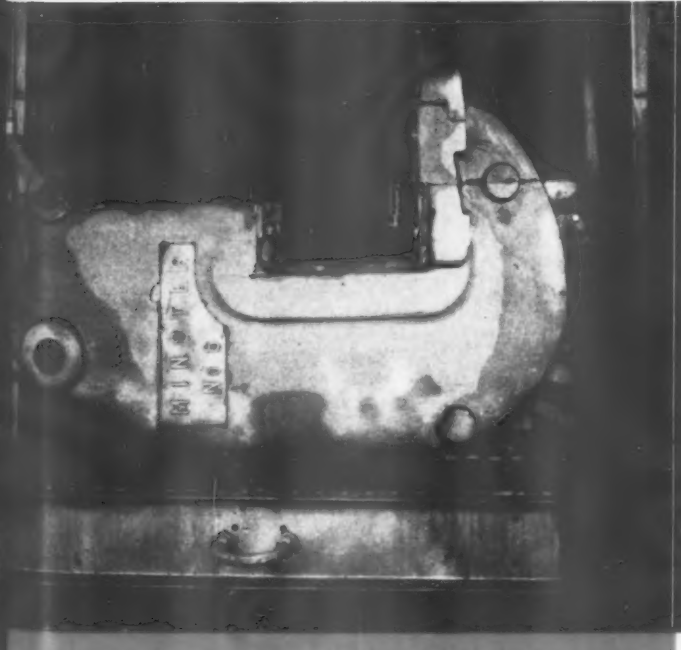
The sand on your foundry floor represents a minimum cost to you of $3.00 per ton. Hydro-Blast may reclaim 85 percent of that sand for 70 cents per ton. As cores and surfaces are Hydro-Blasted, the sand is washed, classified and dried to the desired moisture content and returned to the heap, thereby transforming a distinct liability into a profit that usually pays for the investment in Hydro-Blast within one year.

Hydro-Blast employs wet sand and water to knock out cores, surface clean castings to microscopic cleanliness and remove imbedded sand particles, so that chipping, grinding and machining costs are greatly reduced. Two unskilled laborers and Hydro-Blast can do the work of ten sand chippers, and do it far better, while releasing eight men for other highly essential work.

Hydro-Blast also makes a direct contribution toward more healthful working conditions. In every foundry where "before and after" dust counts have been made, it has been found that the atmosphere in the Hydro-Blast room, as well as the surrounding atmosphere, is cooled and cleansed to a marked degree.

Today, more than fifty Hydro-Blast systems are working for such outstanding foundries as Ford Motor, Symington Gould, Joshua Hendy Iron Works, Worthington Pump, American Manganese Steel, and a host of others.

Foundry executives and engineers who are not familiar with Hydro-Blast's efficient, economic and hygienic advantages, will be given free information on request.

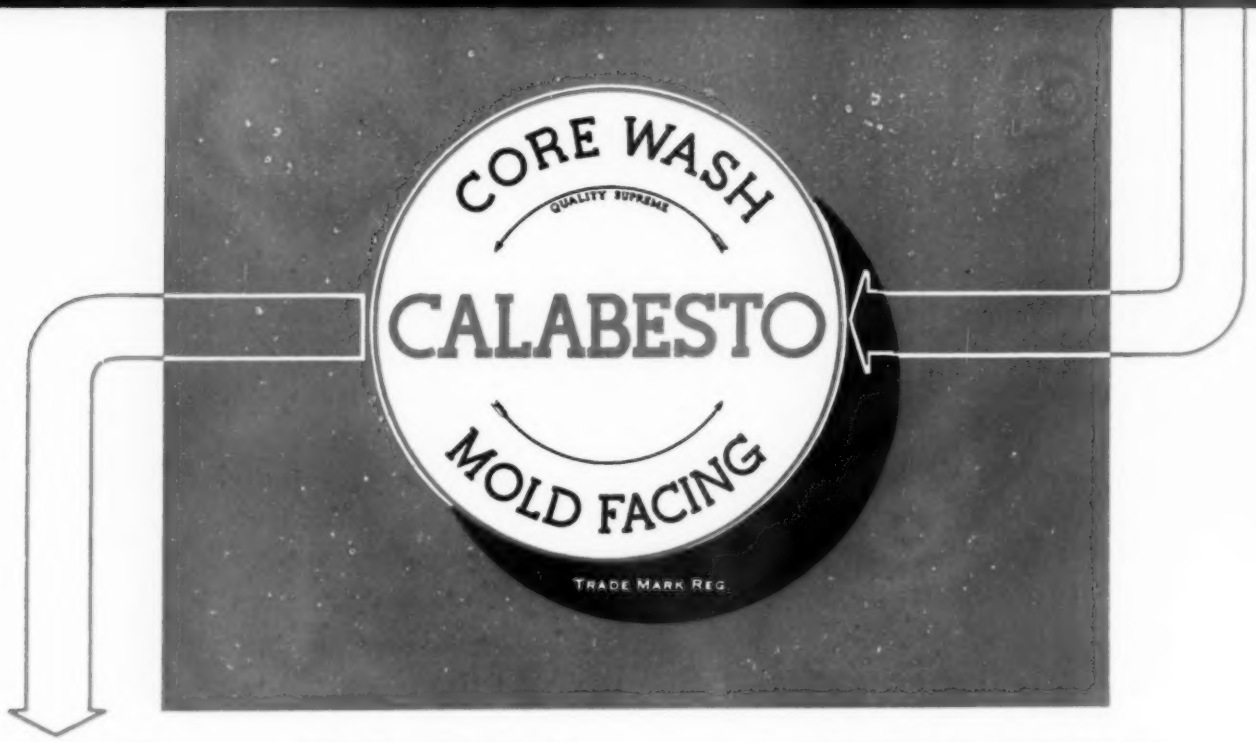


This is the same machine tool casting shown above after Hydro-Blast had knocked out the cores, scrubbed the surface and recovered the sand.

THE HYDRO-BLAST CORPORATION

2550 North Western Avenue • Chicago

Announcing Something New



For BRASS and BRONZE

We say CALABESTO is new—but its ingredients are old and well tested. This superior core wash and mold facing is prepared from a combination of heat resisting minerals of high refractory value. They were selected by experimental elimination, and the result, CALABESTO, is now offered to the non-ferrous foundry industry as a core wash and mold facing expressly manufactured for brass and bronze work.

CALABESTO is a departure from Plumbago washes and facings. It is remarkably clean, and does not draw dampness. Packed only in dry, powdered form, CALABESTO is made ready for use merely by mixing plain water with the dry powder. Then it can be applied by brush, swab or spray gun.

We urge non-ferrous foundrymen to get acquainted with CALABESTO, and to try it out on cores, sand molds and furnace linings.

Agents and jobbers who are interested, may write to us about CALABESTO, the new core wash and facing that came out of the West.

PACIFIC GRAPHITE WORKS

40th and LINDEN STREETS • OAKLAND, CALIFORNIA

FLAW or BULLET?
. . . EITHER CAN MEAN DISASTER

FOR LIGHT ALLOYS AND DIE CASTINGS

KELEKET PROVIDES BETTER THAN 5% FLUOROSCOPIC SENSITIVITY

Producers of light alloy castings will be interested in KELEKET'S Fluoroscopic equipment. Except in the few cases requiring film records this apparatus meets all requirements for X-ray inspection. ¶ The savings resulting from the elimination of film and processing costs are substantial.

ONE of our tanks is out of commission. What did it . . . an enemy bullet, shell, bomb? Perhaps. But it also could have been caused by some flaw in the construction . . . a structural weakness that only the test of battle brought to light. In either case, the result is the same . . . our tank is disabled, useless and out of action.

Flaws that may result in material failures often pass inspection because they are not detected by surface examination. However, inspection by X-ray removes this guesswork and reveals defects in the "inside" structure.

In many leading war plants KELEKET X-ray units are on the job detecting hidden flaws in critical materials ranging from thin aluminum sheets to heavy armor-plate . . . assuring our fighting men safer tanks, planes and ships.

A KELEKET Industrial Engineer will gladly consult with you and discuss the practical applications of X-ray inspection for your plant. There is no obligation.

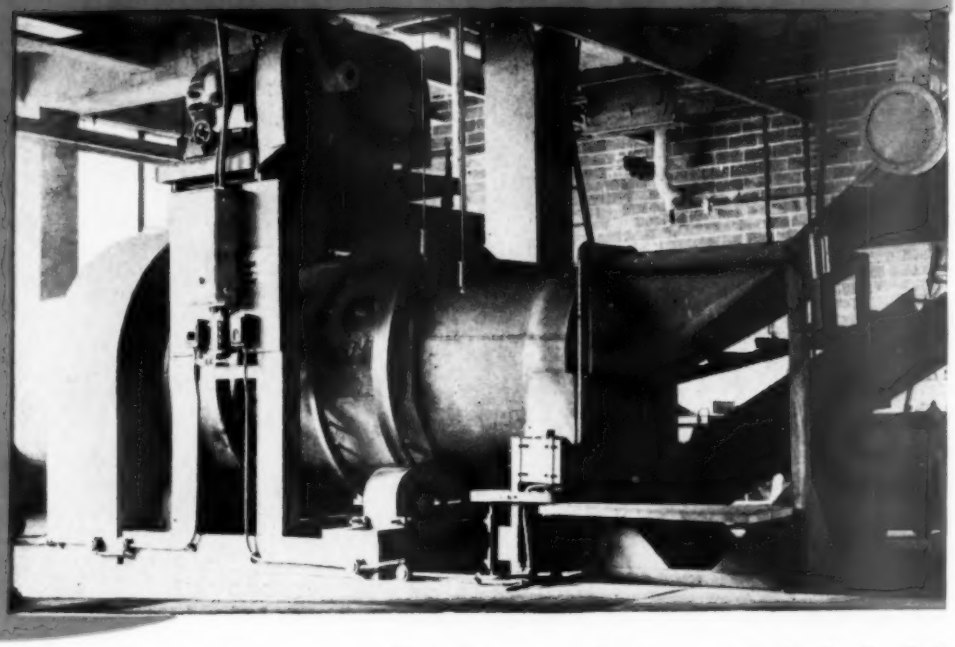
KELLEY-KOETT X-RAY MFG. COMPANY
2277 WEST FOURTH ST., COVINGTON, KY.

PIONEER CREATORS OF *QUALITY* X-RAY EQUIPMENT SINCE 1900

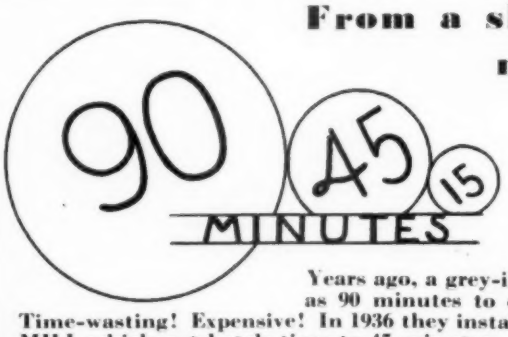
PROGRESS

RANSOHOFF *Automatic Star-Return* TUMBLING MILLS

speedy . . .
gentle . . .
stars enter and return automatically



Discharge end of mill showing grey-iron castings delivered directly onto inspection conveyor.



From a slow, wasteful 90 minutes to a swift, economical 15 minutes

Here's the progress-story:

Years ago, a grey-iron foundry used to take as long as 90 minutes to clean grey-iron castings. Slow! Time-wasting! Expensive! In 1936 they installed a RANSOHOFF TUMBLING MILL which cut batch-time to 45 minutes. A saving of one-half! Not long ago we ran tests and shaved batch-time to a mere 15 minutes. Swift! Economical! And now, in 1943, with their new, improved RANSOHOFF WET TUMBLING MILL they're getting run after run in

ONLY 15 MINUTES FOR A COMPLETE BATCH

Here's how it's done: By the RANSOHOFF METHOD castings cascade in a mass in which stars of varying sizes are so intermingled that all voids are filled completely. Result is very rapid cleaning without nicking or breaking or excessive mill wear. Replacement costs are almost nil. Dust and dust collectors are eliminated and health hazards are reduced. Try this in *your* foundry!

Send us samples for free tests.

N. RANSOHOFF, Inc.

Township Ave. and Big 4 R.R.
CINCINNATI, OHIO

Safety Message: "Collect Magnesium Dust in Oil"

Have you any incendiary bombs in your plant? Magnesium under certain conditions is inflammable and explosive; and magnesium fires are exceedingly difficult to extinguish. Magnesium has excellent properties for bombs for enemy industrial plants and military objectives, but these properties of magnesium must be kept under effective control in your own plant.

The combustible and explosive magnesium dust created in machining and grinding operations brought with it a peculiar problem. The fact that magnesium is the lightest and easiest of all metals to machine accounts for the volume of dust given out. Magnesium dust, when wetted with water, produces hydrogen gas which is explosive in certain mixtures. We have been working on this problem since 1937, when the first Schneible magnesium dust collecting system was designed and installed for a leading magnesium producer.

Schneible engineers sponsored the use of a high flash point mineral oil as the collecting medium for magnesium dust. This has proved universally satisfactory for the following reasons:

(1) *Oil-coated magnesium particles are safe from explosion or rapid burning. They do not disintegrate and produce hydrogen gas.*

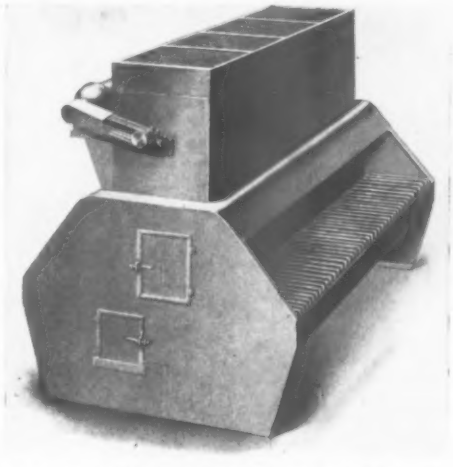
(2) *The air from the collector may be returned to the workroom, as it contains no hydrogen gas.*

(3) *Either large systems or small units, as the best economy and engineering directs, may be employed with equal safety.*

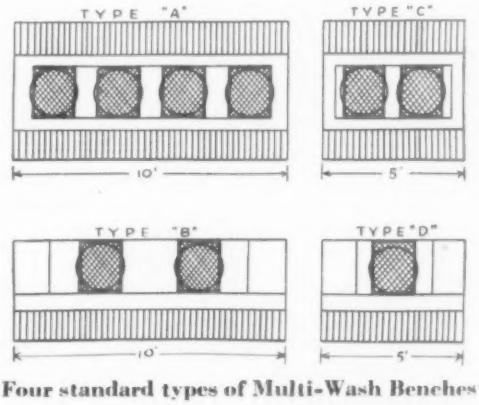
(4) *The oil used can be spent cutting oil, which has been discarded from machine shop operations. No expenditure is involved, and oil can be used over and over in the collectors.*

(5) *Magnesium dust can be recovered.*

Schneible now offers a complete line of dust collecting equipment for magnesium plants which includes: Downdraft Benches in several types, large and small; "Uni-Flo" Dust Hoods for use when preferable; Pedestal Grinder Exhaust Systems; a number of adaptations of Schneible Multi-Wash Collectors; and Multi-Louver Settling Tanks for returning the oil to the collector system and recovering the magnesium dust. All Schneible systems are characterized by maximum safety, low cost, moderate operating cost and minimum maintenance. Our Engineers will gladly work with you on layout and arrangements. Write for Bulletin 1142 on magnesium dust collecting to Claude B. Schneible Company, 3953 Lawrence Ave., Chicago, (44) Ill. Engineering Offices in Principal Cities.



Type "A" Multi-Wash Ventilated Bench



Four standard types of Multi-Wash Benches

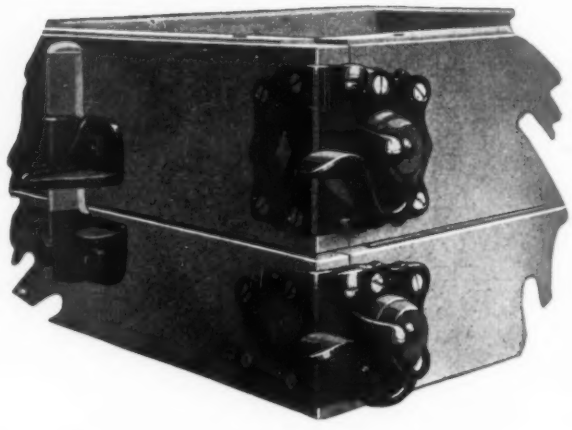
SCHNEIBLE

DUST AND FUME CONTROL EQUIPMENT

A *Real* INVESTMENT FOR MORE PRODUCTION!

DIAMOND FLASKS

No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:



■ A SUPERIOR LATCH (exclusive)

It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

■ PRECISION-MADE

Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

■ A PATENTED HINGE (exclusive)

Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

■ SPECIAL SHAPES

We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

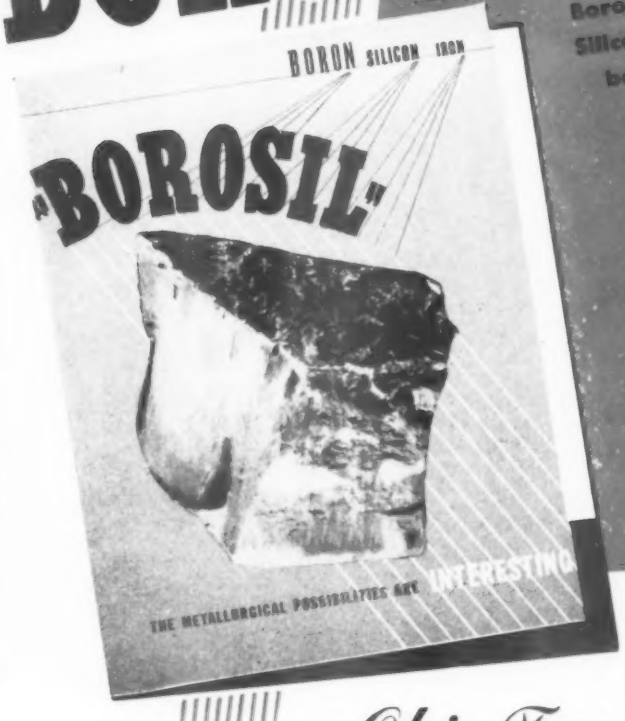
Designers of CORE PLATES, JACKETS, BANDS, FLASKS *since 1889*

Simanal

Silicon 20%,
Manganese 20%,
Aluminum 20%,
balance Iron

BOROSIL

Boron 3 to 4%,
Silicon 40 to 45%,
balance Iron



SIMANAL and BOROSIL are modern ferro-alloys produced to formula under close control—providing remarkable advantages in steel manufacture. Their characteristics are described in folders which are available upon request, without obligation.

PHILO — DEPENDABILITY · QUALITY · SERVICE

RANNEY — DEPENDABILITY · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation

Canton, Ohio

CHICAGO · DETROIT · PITTSBURGH · TACOMA

Simplicity
QUAD SHAKE-OUTS
Do Giant's Work!

The Simplicity Quad Shake-Out, shown by cut, was installed in August, 1937, and has operated daily under loads up to 130,000 pounds

SIMPLICITY QUAD SHAKE-OUTS are operating today in many foundries producing large castings for war work. One such job is the unit cast tank hull, which with flask and sand weighs around 170,000 pounds. The flask is shaken out and the core sand knocked out of the hull casting in the total elapsed time of only ten minutes.

Quad Shake-Outs have been built in sizes ranging from 10′ x 10′ to 15′ x 22′ in vibrating area. Special deck areas can be supplied for special jobs. The positive blows struck against the flask or casting by the massively constructed vibrating units assure fast and certain movement of the sand, no matter how hard it is baked.

Our engineering representatives will check your job and recommend the proper equipment.

"Purchase Shake-Out Certainty and Assured Service"

Simplicity Engineering Company

DURAND, MICHIGAN

For Canada: Waterous Limited, Brantford, Ontario

Kool Pore

. . . for heavy cuts and fast removal of metal without burning. These BAY STATE highly porous and cool cutting grinding wheels for TOOL AND CUTTER and SURFACING jobs can't be beat! Try them.

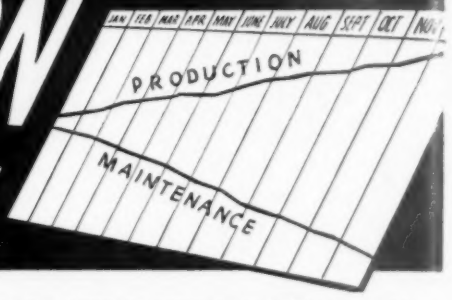
BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

HOW STAYNEW FILTERS

FOR AIR ★ GASES ★ LIQUIDS

INCREASE PRODUCTION DECREASE MAINTENANCE



STAYNEW PIPE LINE FILTERS KEEP AIR-POWERED TOOLS WORKING SMOOTHLY

MODEL CPHS
For Compressed Air Lines

On compressed air lines, Staynew Filters prevent the passage of dust, dirt, rust, pipe scale, and condensed moisture. Solid matter causes clogging and loss of power in air-powered tools; water washes away lubrication or freezes such tools; both solid matter and water may cause delays and waste at other points.

Remove Sediment from Liquids

On liquid lines, Staynew Filters assure clean water, coolants; fuel, lubricating and other industrial oils; many special liquids.

Eliminate Hazard of Oil and Moisture in Automatic Controls

Many special pipe line filters available; including new "super" filter for the removal of traces of oil and moisture from lines to air-operated control instruments.

★ ★ ★ ★

STAYNEW INTAKE FILTERS MAINTAIN EFFICIENCY OF ENGINES AND COMPRESSORS

Staynew Intake Filters prevent the suction of dust into engine and compressor cylinders. Dust scores cylinder walls, clogs valves, causes excessive carbon formation, wears reciprocating parts. Users report important reduction in upkeep, continuous efficiency. Complete range of sizes; models include SILENCER - FILTERS.

MODEL D
For Engine Intake

STAYNEW VENTILATION FILTERS *UP* WORKER PRODUCTION, *REDUCE* BUILDING CARE

Staynew Ventilation Filters guarantee delivery of clean, dust-free air, reducing cost of building maintenance, adding to efficiency of employees, eliminating health and accident hazards and preventing waste in many operations and processes. Automatic and Panel types, including fire-resistant constructions and media.

Automatic Air Filter for Building Ventilation

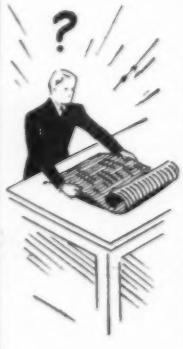
RADIAL FIN INSERT

Exclusive RADIAL FIN CONSTRUCTION

Permits high ratio of filtering area to space occupied. Back pressure is thus relatively low with minimum servicing. It is long-wearing and presents no broad, flat surfaces to break down under destructive pulsations. Featured in pipe line and intake models.

HAVE YOU A FILTER PROBLEM?

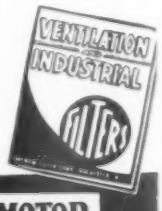
Special *Aircraft* Filters Designed by Staynew Engineers



The broad experience of Staynew engineers is proving invaluable to aircraft manufacturers and designers. This experience, product of more than two decades devoted exclusively to filter manufacture, is yours for the asking.

COMPLETE CATALOG

40 pages describing and illustrating entire Staynew line. Write for copy, mentioning special problems.



STAYNEW FILTER CORP.

"FILTER HEADQUARTERS" — 36 CENTRE PK., ROCHESTER, N. Y.

PROTECTOMOTOR
99 9/10 Per Cent EFFICIENCY
AIR FILTERS

Always at your elbow—

TO HELP YOU GET GREATEST POSSIBLE PRODUCTION OUT OF YOUR EQUIPMENT

Here's a man who knows foundry equipment, lay-out and practice just as well as he knows irons, their melting, pouring and solidifying characteristics and the qualities of the finished castings.

He's the Republic Pig Iron Metallurgist—the fellow who is "Always at Your Elbow" with helpful advice and suggestions on how to get every pound of casting production out of your equipment.

If you are not satisfied with the quality or quantity of your output—if difficulties in production are handicapping profit curves—ask us to send him to your plant to work with you.

There will be no obligation—except on his part, and that to help you.

REPUBLIC STEEL CORPORATION

General Offices: Cleveland 1, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

Republic

PIG IRON

"CHATEAUGAY"
Low-Phosphorus, Copper-Free
"REPUBLIC"
(Northern)
Foundry, Basic and Malleable
"PIONEER"
(Southern)
Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

Cast Your Own Special Refractory Shapes

WITH LACLEDE HEARTHMIX OR SUPER CASTABLE • • • the *Original* Mix and Pour Castable Refractories

Why wait for special refractory shapes when you can keep production rolling by casting them on the job with Laclede Hearthmix (2700° F.) or Laclede Super Castable (2900° F.)? Why spend extra time and money cutting all kinds of special shapes to fit doors, burner rings, baffles, burner blocks, ports, special skews, etc., when you can make them quickly and easily — right on the job — and often have them ready within 24 hours?

Hearthmix and Super Castable are the original mix and pour castable refractories which set at normal room temperature. They are non-shrinking and are not affected by steam or moisture. They will not crack or crumble under alternate heating and cooling periods and do not deteriorate during intervals of non-use.

When you need an insulating refractory castable, use Laclede Pore-Lite, a light weight insulating castable that withstands temperatures up to 2500° F. in direct contact with flame. Approximately 4½″ of Pore-Lite is equivalent to 15″ of first quality fire brick or 7½″ of heavy weight castable.

It isn't necessary to take a chance on holding up production. Keep these castables on hand all the time for those unexpected jobs. Your local dealer or agent will be glad to furnish them. ***Get his name from your local telephone directory, or write direct.***

LACLEDE ENGINEERING SERVICE

When you have a problem involving refractories, call in a Laclede-Christy engineer. Because Laclede-Christy offers a *complete* line of refractories, he will give you an unbiased recommendation — the *right* recommendation for your job. Complete blueprints and estimates will be furnished without cost or obligation.

LACLEDE-CHRISTY FOUNDED 1844 ST. LOUIS, U.S.A.

LACLEDE-CHRISTY
CLAY PRODUCTS COMPANY

Ambassador Bldg., St. Louis, Missouri

World's Largest and Most Diversified Line of High Temperature Refractory Specialties

Photo courtesy of The Roosevelt Military Academy, Aledo, Illinois

God Bless America

"From the halls of Montezuma to the shores of Tripoli", throughout the world, the American flag waves proudly—a symbol of freedom not only to Americans but to the millions of oppressed and subjugated peoples of the earth. Duty to humanity demands that Americans help them win freedom and obtain justice.

The foundry industry is doing its share. It is shouldering its responsibility and providing superior guns, tanks, planes and ships for the boys who keep our flag flying.

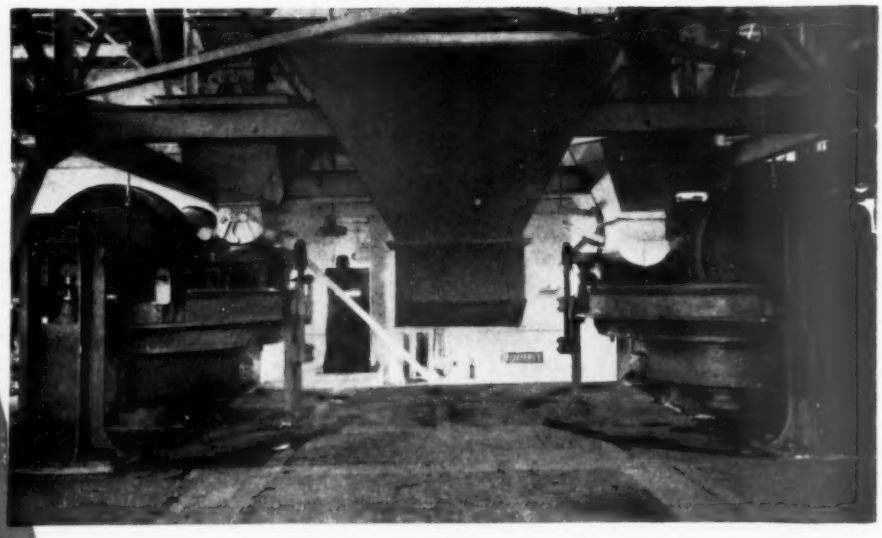
DAVENPORT

We will be pleased to send to you our illustrated catalog showing our Modern Molding Machine line.

DAVENPORT MACHINE & FOUNDRY CO.

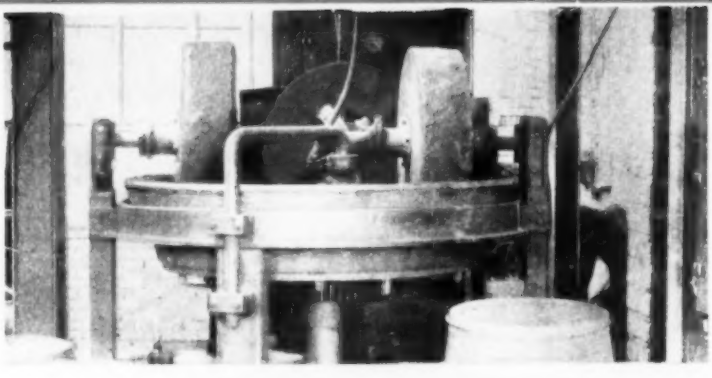
DAVENPORT **IOWA, U. S. A.**

SUCCESSFUL INSTALLATIONS EVERYWHERE!



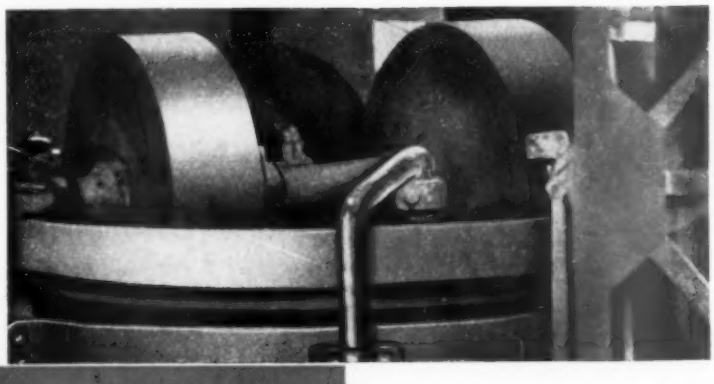
Two large Clearfields in a steel foundry. This user has seven.

CLEARFIELD
SAND MIXERS



This 610 unit prepares facings in an iron foundry.

For today's increased foundry production—as well as in future years—the Clearfield line covers every foundry requirement for speedy, efficient and economical mixing. To meet the ever growing foundry demand in the United States and Canada for Clearfield exclusive features, units of 4 to 40 cubic feet batch capacities, embodying every fine Clearfield feature, are available.



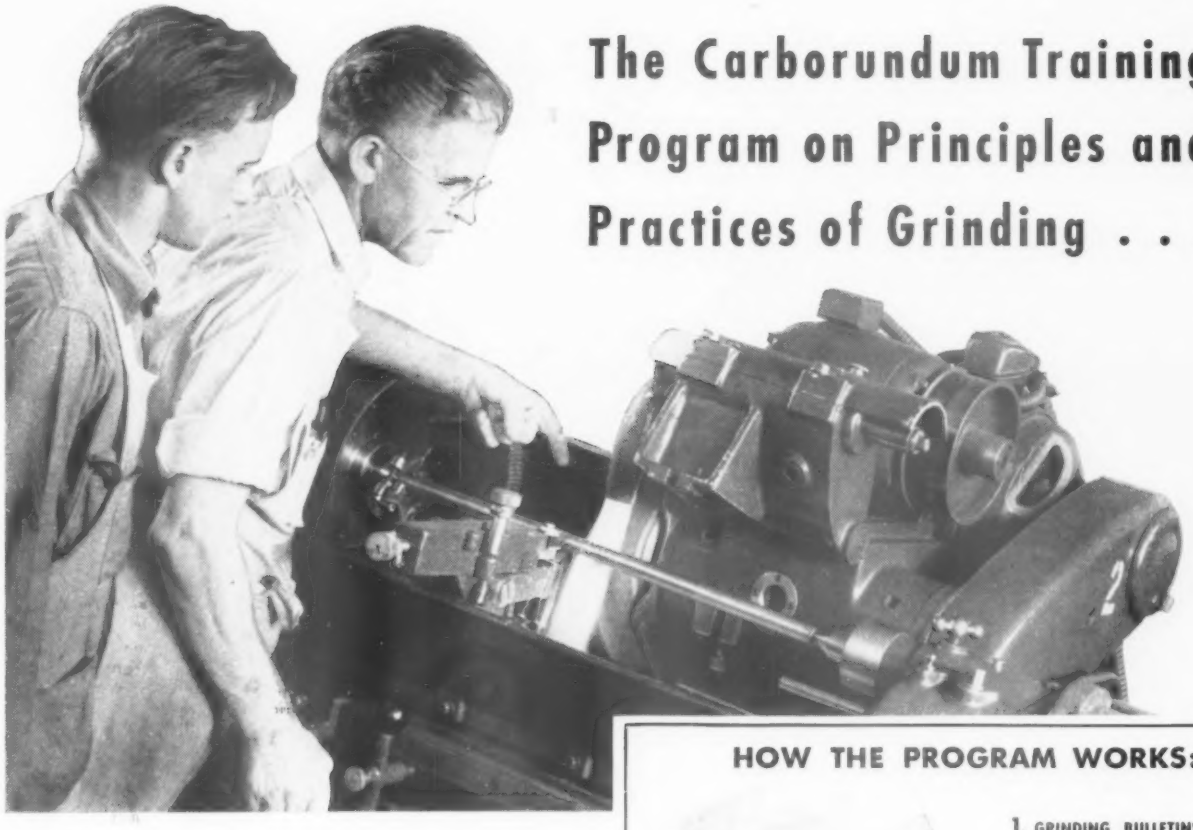
610 Mixer and Loader on cement mold material.

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

WRITE

for Clearfield Data. For a definite proposal, state quantity and type of sand to be conditioned, and characteristics of available electric current

FREE! FOR TRAINEES IN INDUSTRY!



The Carborundum Training Program on Principles and Practices of Grinding . . .

THE problem of training green workers for precision war work is one of the biggest jobs industry has ever tackled.

Here is our contribution to its solution—a streamlined course in the principles and practices of grinding, offered to trainees in *your* Plant!

The purpose of the Carborundum Training Program is to explain in simple, non-technical terms the fundamentals of grinding and thereby help make better grinder hands of trainees, apprentices and students.

This course is designed for both classroom and small group instruction. Since its introduction, it has been widely adopted throughout industry. We hope it may help you, as it is helping others, to simplify the training of new grinder hands and to speed them on their way to higher production and greater accuracy.

THE CARBORUNDUM COMPANY
REG. U. S. PAT. OFF.

Niagara Falls, N.Y.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

HOW THE PROGRAM WORKS:

1. GRINDING BULLETINS. A set of 25 four-page bulletins for each trainee, offering a concise, non-technical discussion of grinding wheels and their functions. Sample of the contents: "The Abrasive Tools of Industry", "Wheel Stresses", "Wheel Balancing", "Cylindrical Grinding", "Grinding Errors", "Safety".

2. BOUND VOLUMES. A limited number of bound Grinding Bulletins are available for instruction as well as for placement in your classroom or technical library for reference purposes.

Educational Service Department
THE CARBORUNDUM COMPANY, NIAGARA FALLS, N.Y.

We would appreciate your sending us added information on the Carborundum Training Program.

☐ We have regular apprentice training courses. Average enrollment _____ students.
(Number)

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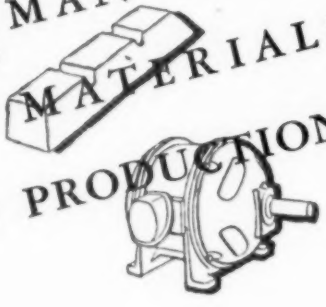
This CONSERVATION PLAN

will help YOU

- SAVE MAN-HOURS
- SAVE MATERIALS
- SPEED PRODUCTION



Wartime Conservation means MORE than just conserving copper, steel, aluminum . . . it means the most strategic possible use of all of the ingredients of Victory—materials, man power, time and ingenuity.

These five major points comprise a complete program developed by Westinghouse for Wartime Conservation. This program packages up Westinghouse engineering experience in the entire field of electric and power equipment and related materials. Examples noted are but five of many specific recommendations.

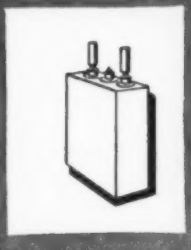
This experience and these recommendations are offered fully and without obligation. If you are not already familiar with them, consult your Westinghouse representative or send for the new 100-page book, "WARTIME CONSERVATION". It will be sent you without cost. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania. J-90483

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Put this 5-point program into action

1. Conserve



by strategic selection, application and use of electrical equipment.

EXAMPLE

Where plant power systems are carrying heavy inductive loads, capacitors release important system capacity and permit use of more motors without adding to transformer, switching and line equipment.

2. Conserve

by utilizing new developments that reduce need for critical materials and man-hours.

EXAMPLE

Hipersil*—a new electrical steel—increases the flux-carrying capacity of transformer and similar cores, large and small, up to 35%. Weight and amount of critical materials can be reduced as much as 50%.

3. Conserve

by utilizing available facilities for preventing breakdowns and machine outages.

EXAMPLE

The Westinghouse "FSL" plan for Fewer, Shorter, Longer-lasting repairs is a complete program of preventive maintenance. Westinghouse engineers will help you inaugurate this program in your own plant.

4. Conserve

by utilizing new materials which in many cases can replace critical materials and do a better job.

EXAMPLE

Prestite—a new pressure-molded porcelain which can be solder-sealed to metal—is replacing bushing assemblies requiring rubber or gaskets to keep out moisture, in many types of electrical apparatus.

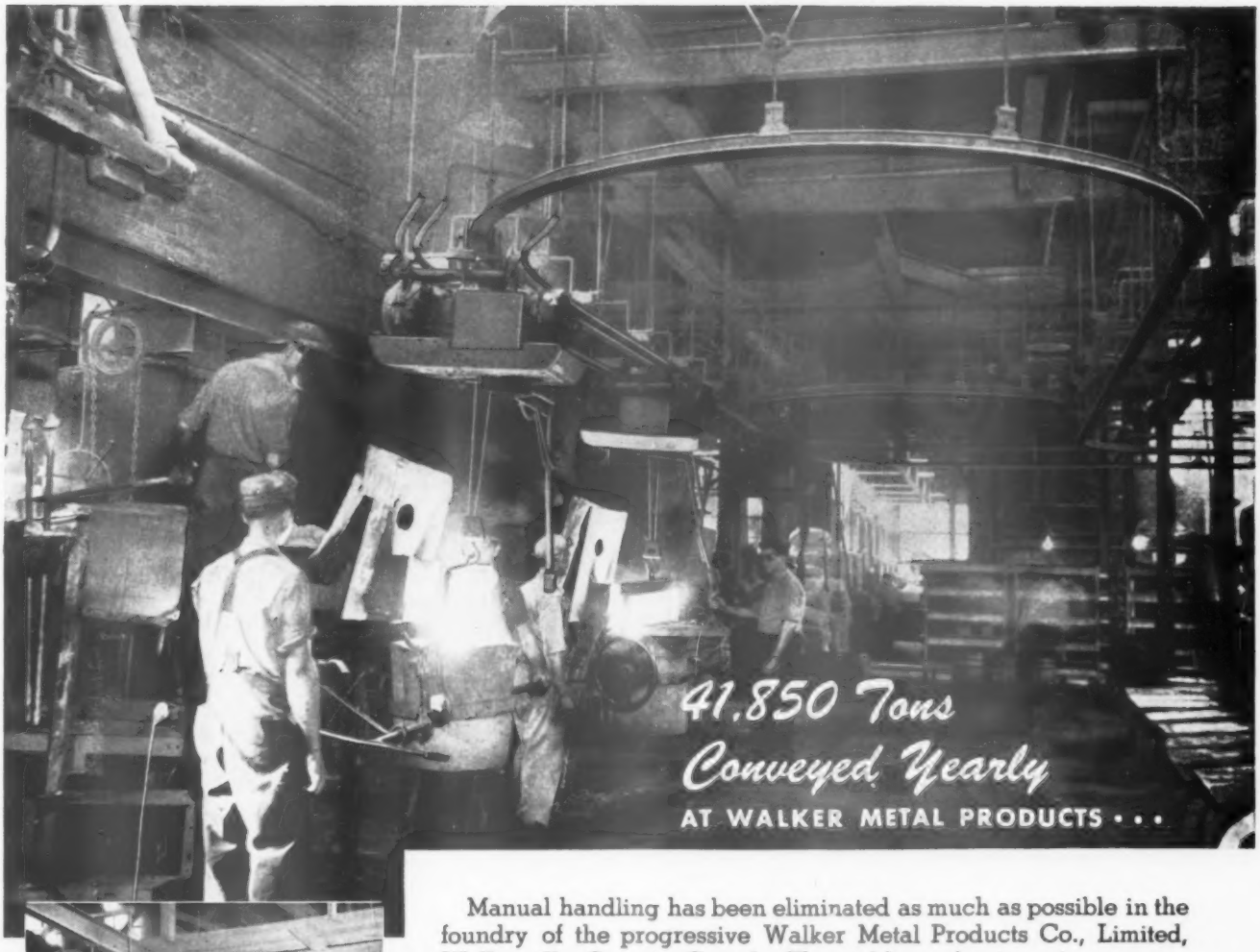
5. Conserve

by tapping all sources of salvageable scrap.

EXAMPLE

Systematic planning can uncover many ways of reclaiming worn equipment and waste material. Samples of salvage forms and organization charts in use in Westinghouse plants will gladly be made available on request.

*Registered trade-mark, Westinghouse Electric & Mfg. Co., for High PERmeability SILicon steel.



Manual handling has been eliminated as much as possible in the foundry of the progressive Walker Metal Products Co., Limited, Walkerville, Ontario, Canada. The molds are kept moving on continuous mold conveyors and all hot metal is transported over the Cleveland Tramrail overhead materials handling system.

The Tramrail System is so laid out that hot metal can be delivered to each of the mold conveyors directly from the cupolas and poured into the molds while on the move without rehandling. The molten iron is transported on one track and the empty ladles returned on another. Five one-ton hand-propelled carriers with push-button-operated hoists are operated continuously.

Much heavy lifting, pushing, lugging, common in most foundries, has been eliminated and such efficiency introduced that the motor blocks, cylinder heads and other castings are made in a fraction of the time ordinarily required.

A high rate of production has been maintained ever since the Cleveland Tramrail system was installed in 1929. Approximately 150 tons of metal are transported over the main tramrail line every 16-hour working day, or 41,850 tons per year.

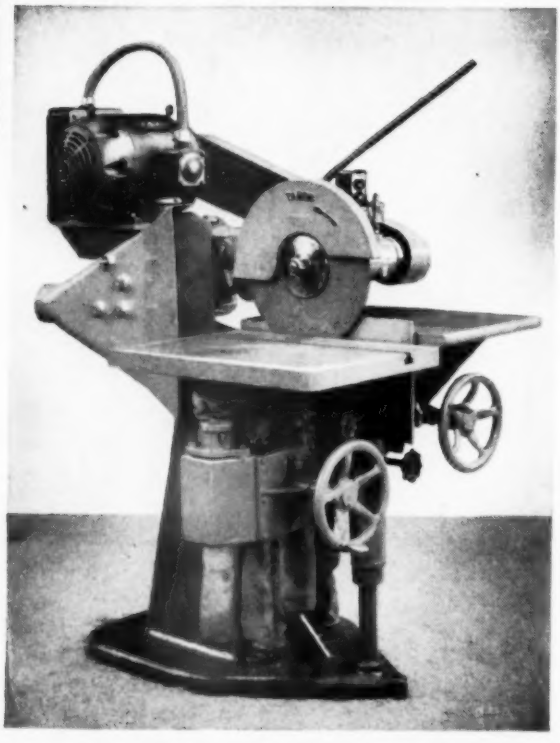
GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Save PRICELESS TIME with the...

TABOR-BRASIVE CUT-OFF MACHINE



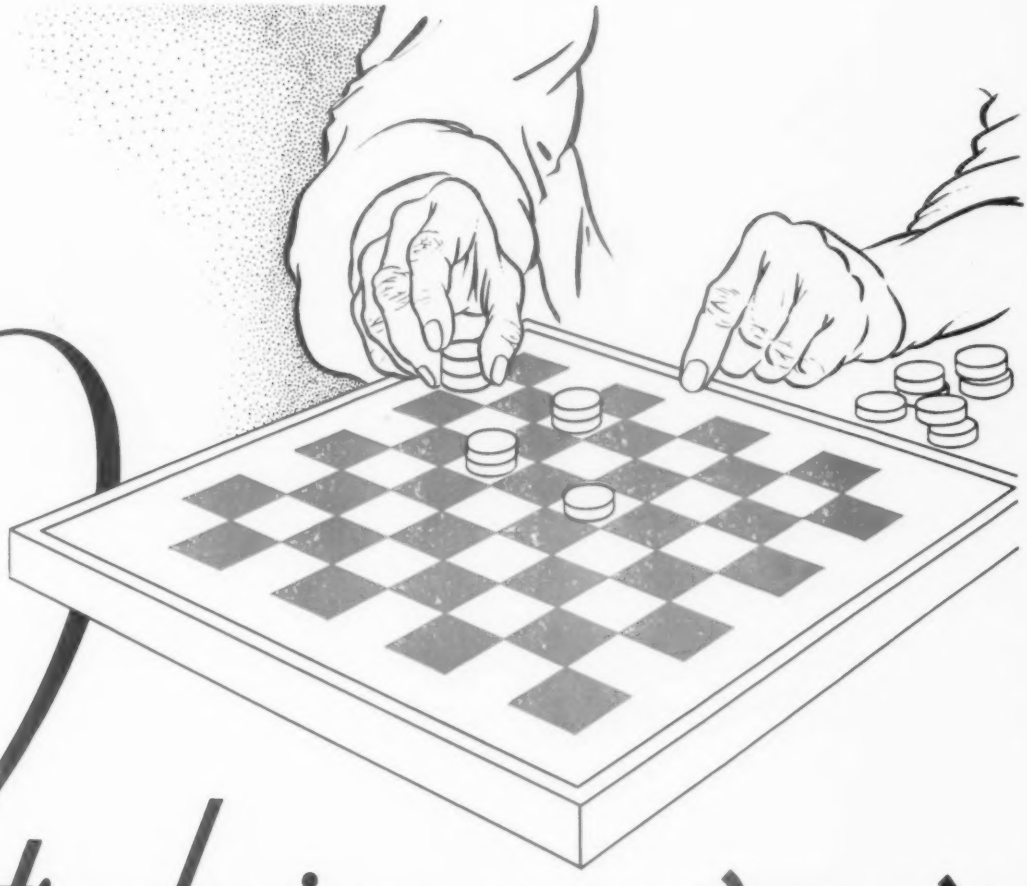
The above-all need of the day is high and ever higher production. Between pouring and shipping no time can be lost . . . and none need be.

A Tabor-Brasive Cut-Off Machine will more than keep pace with your increased production schedules. It will cut gates and risers from castings of manganese bronze, aluminum bronze, nickel, monel and other tough-cutting metals in a matter of seconds—unbelievably fast. Cuts are clean and close to the casting—snagging and finishing grinding are reduced to a minimum, often entirely eliminated.

Write for information, giving details of your cutting problems. There is a Tabor-Brasive Cut-Off Machine of a size and type to meet your requirements.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: *Los Angeles, Calif.,* Snyder Foundry and Supply Co.; *Oakland, Calif.,* Pacific Graphite Co.; *Seattle, Wash.,* Carl F. Miller & Co.



Introducing a new move:

AQUA-BOND

an emulsified type of oil which has qualities of special value for core work

To a large extent, AQUA-BOND No. 310 is a revolutionary product, and is particularly recommended to foundrymen for the following reasons: cores have a more even cross-sectional strength; it reduces gas to a minimum; less heat and less baking time is required; it keeps cores open and well vented throughout; cores are stout enough to resist normal washing action of hot metal; AQUA-BOND is clean in the core boxes and clean on the hands of the core maker; sharp sand can be used alone or in a 3-1 ratio with fine sand; cores can be stored successfully; venting can be reduced, and in some cases eliminated.

It is difficult to condense the prime features of a laboratory and foundry-tested product. Essential facts can be stressed, but not elaborated. AQUA-BOND possesses so many important properties, we believe you should know about them. We will be glad to furnish this information on request.

UNITED OIL MFG. CO.

1429 WALNUT STREET, ERIE, PA.

FANNER CHAPLETS

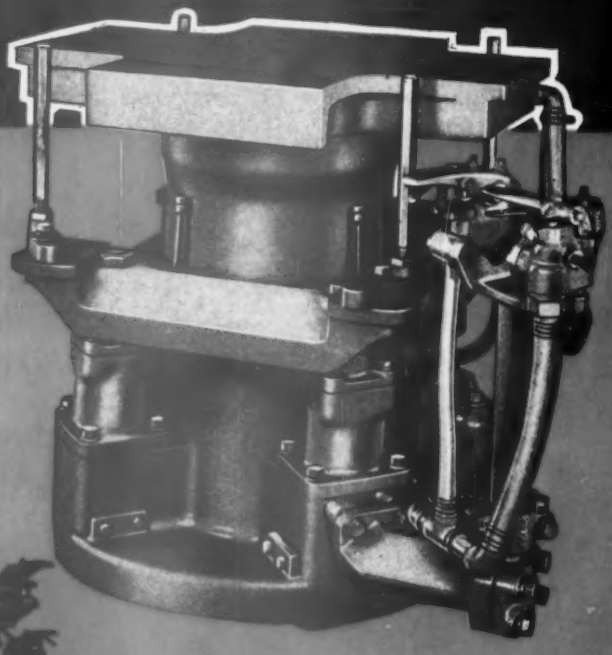
Whatever your CHAPLET requirements may be,
there is a FANNER CHAPLET to fit the job.

THE FANNER MANUFACTURING COMPANY, CLEVELAND, O.

THE CANADIAN FANNER LTD., HAMILTON, ONTARIO, CANADA

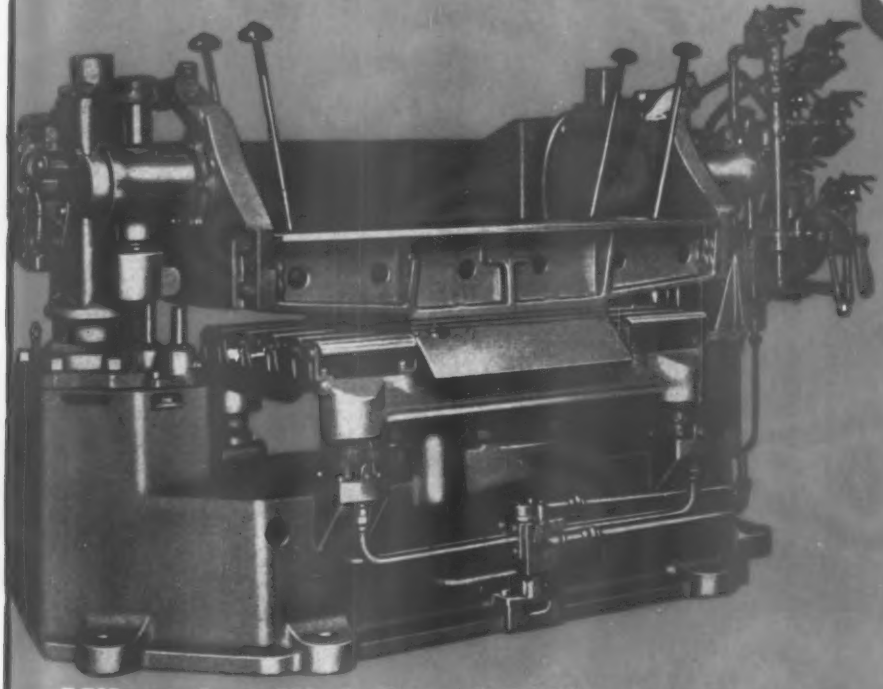
. . . a pair of ACES for your Foundry!

HERE are two fast, versatile molding machines, engineered primarily for miscellaneous jobs requiring inexpensive pattern equipment . . . a pair of "Aces" with which you're bound to win today's battle of production. With industry stepped up to a "new high", SPEED is the all-important factor today. In plants all over the country, these modern Milwaukee Molders have amply proven their ability to meet stringent war-time schedules. They produce molds on a fast production basis, yet maintaining the highest quality standards.



Milwaukee Jolt Pin Lifter

Simple in design with the fewest possible working parts, this modern machine has a solid, true jolting action and a precise, controlled oil draw. The lifting frame consists of a rigid integral member actuated by four equally spaced pistons. Capable of handling a wide range of molding jobs. Made in all sizes.



Milwaukee High Speed Rollovers

Designed by Milwaukee Engineers to meet today's demands for high-speed molders, capable of handling a wide range of work. Equipped with automatic air clamps, power rollover, quick-acting pistons and instantaneous hydraulic leveling. Available with draw pistons BELOW or ABOVE floor line . . . with or without jolt.

MILWAUKEE FOUNDRY EQUIPMENT CO.

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LOGISTICS is the word for the exact military science of supply and delivery. Upon the speed and facility with which this branch of the service can function depends the eventual outcome of the war. On the factory front, too, adequate supply and delivery of raw materials are just as vital.

And that is where Federated Metals steps in. With its geographically strategic plants and distributional centers adjacent to or an integral part of every important manufacturing center, Federated is equipped and keyed to fill wartime's demands for non-ferrous metals of dependable quality.

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Logistics
is another word for
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ALUMINUM	SOLDER
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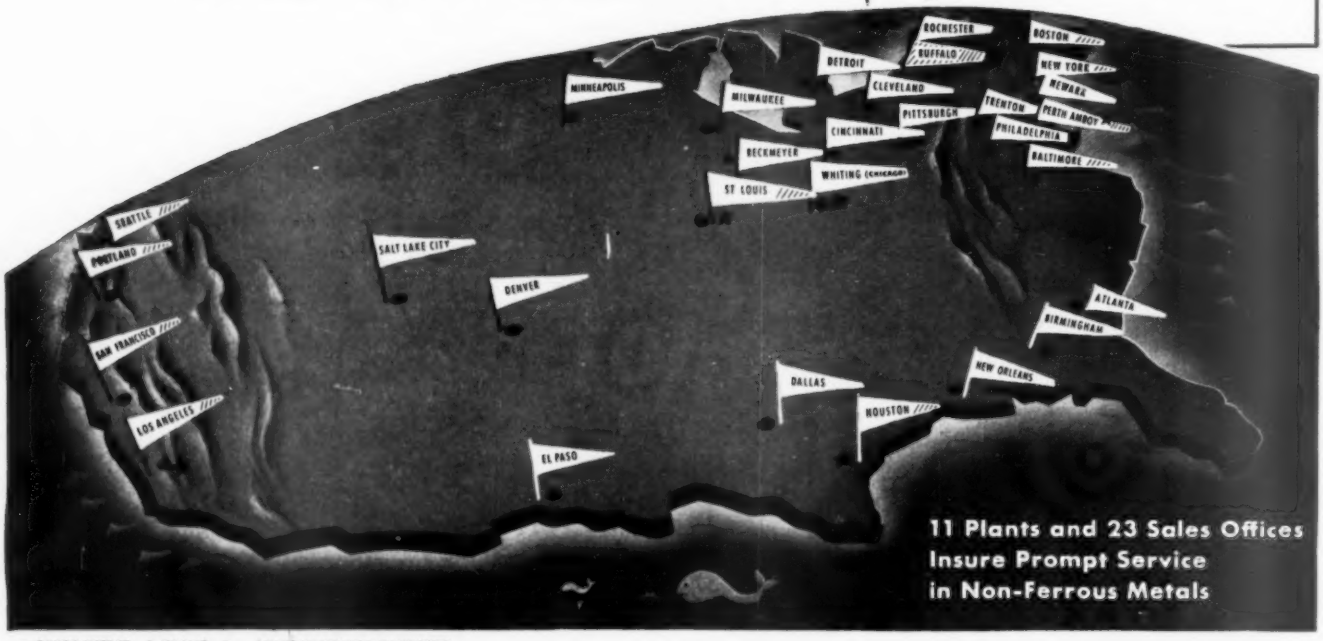
All of these in all commercial forms – Special Alloys to your specifications.



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FEDERATED METALS DIVISION
AMERICAN SMELTING AND REFINING COMPANY

COLLAPSIBILITY

"The ability of a sand mixture to break down under the conditions of temperature, atmosphere and pressure existing during solidification and cooling."

The basic materials in Core and Molding Sand mixtures are Silica Grains, Bonds and Moisture.

Every material in a sand mixture influences Collapsibility.

The desirable degree of collapsibility pays high dividends. It is a guarantee against cutting and hot tears and pays well in the Cleaning Room.

Collapsibility is easily adjusted by using binders of proven performance.

Produce smooth castings and eliminate defects with good sand mixtures. There's a McCormick Binder for every job.

J. S. McCORMICK COMPANY
25TH STREET AND A. V. R. R.
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LION BINDER—MOREBOND—EASY CLEANER CORE COMPOUND

A Distinctly Superior Jacket

ENDORSED BY STEEL FOUNDRIES EVERYWHERE

FREMONT JACKETS were designed with special ribs to permit the escape of gas from the mold. Accurate machining and drilling insures exact and precise corners. Steel foundries everywhere pronounce them "distinctly superior" for their requirements.

Fremont jackets can also be furnished without ribs when so desired.

THE FREMONT FLASK COMPANY
FREMONT, OHIO

Slip Flasks **FREMONT** GROOVLOCK Jackets

If you burr, grind or polish...

Investigate this MAHON COMBINATION WORK BENCH AND DUST COLLECTOR UNIT

it in sizes to accommodate 1
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● Here is a dust collecting mechanism that is ideally adapted to the needs of many industries. Combined in one compact unit is a hooded, ventilated work bench, together with an automatic system for depositing all harmful dust and chips directly under water. No expensive system of hoods and ducts is required. There are no screens, nozzles or pumps to clog or wear out. Only ONE moving part—the exhaust fan. Operation is entirely automatic. Simply start the fan and dust is drawn through a wooden grillage in the floor of work bench and submerged in a tank of water immediately below. The unit is portable and may be set up anywhere that water, sewer and electrical connections can be made. Inexpensive to buy. Economical to operate. Write for descriptive folder.

Especially effective where MAGNESIUM alloys are processed. The hazard of FIRE is avoided because there are no ducts in which this explosive dust can be confined. Dust is immediately placed under water.

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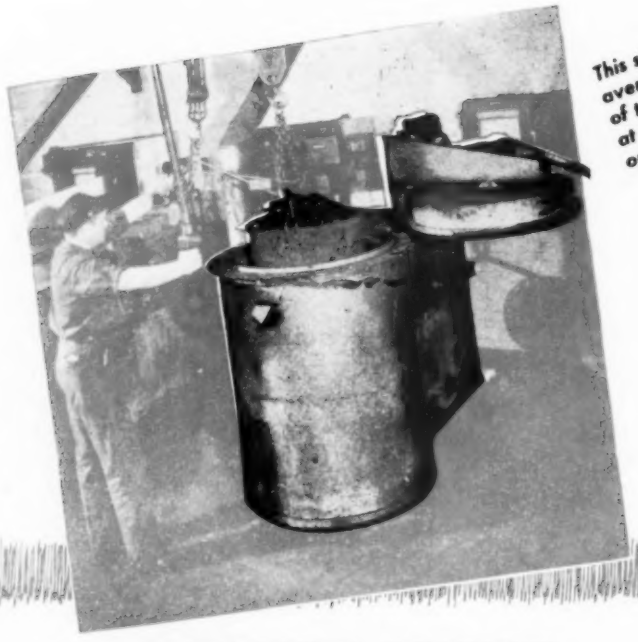
Designers and Manufacturers of Metal Cleaning Machines, Rust Proofing Machines, Hydro-Filter Spray Booths, Ovens of All Types, Filtered Air Supply Systems, Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—Including Complete Finishing Systems.



This six year old Cyclone averages over 1500 tons of tempered parts per year at a maintenance cost of only 1c per ton!

6 year old CYCLONE averages 29½ tons of tempered steel per week!

IN JULY 1937, the gas fired Cyclone, shown above, started to turn out uniformly and accurately tempered parts at the rate of 9850 lbs. per day. The work was of various kinds and heated at different temperatures. Today, after almost six years of continuous service and the production of over 9,000 tons of work, this 22" diameter by 26" deep Cyclone is as efficient as the day it was installed.

1¢ PER TON!

Even with heavy production schedules, all of the replacement material, over the span of years, has been only $93.77, or 1 cent per ton average.

The Lindberg Cyclone Tempering Furnace, like all Lindberg equipment, is built to "take it." Before it is ever announced to the trade, each furnace has to pass the grueling gauntlet of several commercial production lines. It is worked on by heat treater and engineer alike until it can be honestly okayed as the "practical furnace for the practical heat treater."

BULLETIN 52 AVAILABLE

Bulletin 52, on the Gas Fired Cyclone Furnace, shows the wide range of sizes available, a cross section view showing the famous Lindberg recirculating principle, construction features and pictures of Cyclones at work on a wide variety of work. Bulletin 52 will gladly be sent on request. WRITE TODAY!

LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET • CHICAGO

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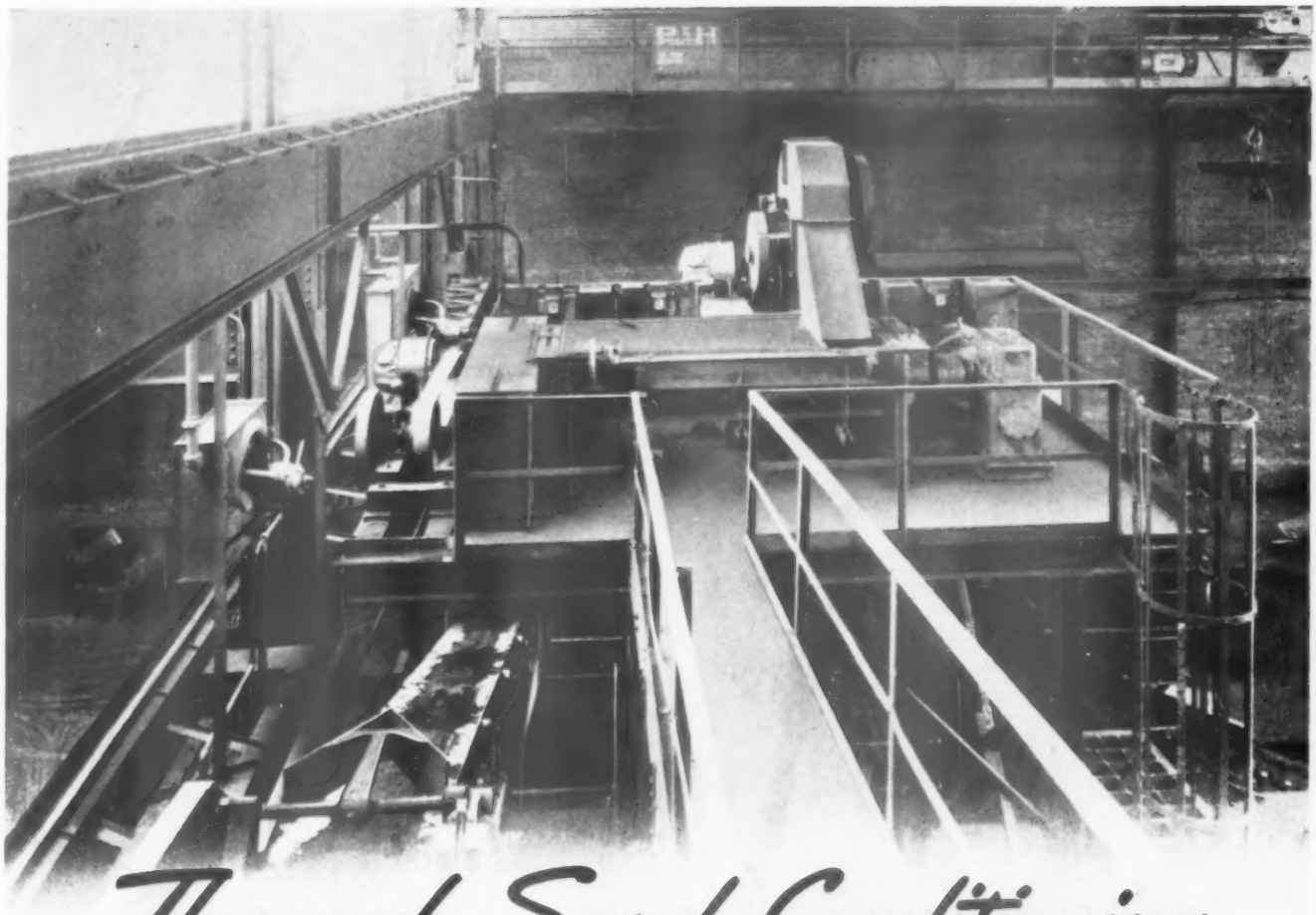
ARMY E NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening



Thorough Sand Conditioning
is essential to successful operation

● Bartlett-Snow Conditioning Equipment, gives the sand new life under mechanically controlled conditions. It provides a more uniform, and more thorough mix than can possibly be secured in daily production with hose and shovel methods,—and the work is done usually overhead, resulting in great savings of floor space.

Lost molds are fewer when Bartlett-Snow mechanized conditioning methods are used. The number of defectives is lower. Output per given floor area is much increased, permitting the "overhead" to be distributed over a larger production resulting in a less costly, more salable product. The efficiency and the health of the workers is much improved. The cost of the equipment need not be large. Frequently, quite great savings are secured from modest installations.

Our recently issued 40-page Foundry Bulletin No. 91 which illustrates many different arrangements of sand conditions plants and other Bartlett-Snow Foundry Equipment,—will be of great interest to every foundryman. Send for a copy!

THE C. O. BARTLETT & SNOW CO.

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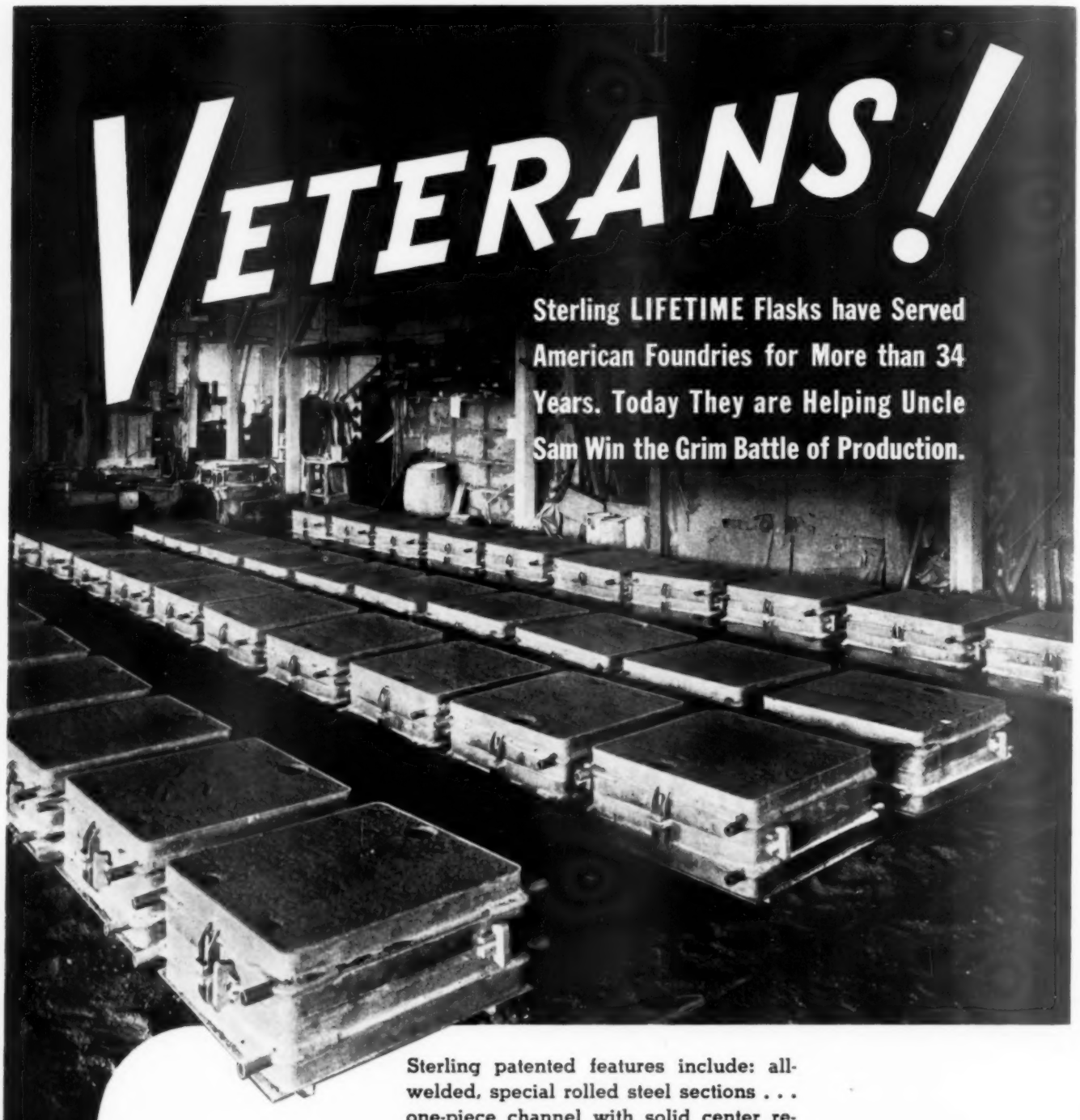
FOUNDRY SAND, MOLD AND CASTINGS HANDLING • • DUST AND FUME CONTROL SYSTEMS • •

VETERANS!

Sterling LIFETIME Flasks have Served American Foundries for More than 34 Years. Today They are Helping Uncle Sam Win the Grim Battle of Production.



Sterling patented features include: all-welded, special rolled steel sections . . . one-piece channel with solid center reinforcing rib and square flanges . . . full-width bearing. Many sizes, styles and shapes available . . . consult **STERLING!**

Patent No. 1974292

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How we can help you meet your *Ferro-Alloy Requirements*

"Electromet" Ferro-Alloys and Metals for the Cast Iron Foundry

Added to the Cupola	*Result*
"EM" Silicon Briquets (round)	Deoxidize and aid machinability by graphitizing effect. Reduce chill in light sections. Permit easy control of silicon additions.
"EM" Chromium Briquets (hexagonal)	Increase hardness, wear resistance, corrosion resistance, and heat resistance. Promote greater density. Permit easy control of chromium additions.
"EM" Silico-Manganese Briquets (square)	Act as a scavenger. Harden iron when added in large quantities. Permit easy control of manganese additions.
Added to the Ladle	*Result*
85% Ferrosilicon 50% Ferrosilicon	Deoxidizes and aids machinability by graphitizing effect. Reduces chill in light sections. (85% grade used for large additions.)
Silicon-Zirconium	Deoxidizes and graphitizes, improving density of iron.
Ferromanganese-Silicon	Combines graphitizing influence of silicon with scavenging action of manganese.
Ferromanganese	Acts as scavenger. Hardens iron when added in large quantities.
Foundry Grade S.M. Ferrochrome (Designed for rapid solubility)	Increases hardness, wear resistance, corrosion resistance, and heat resistance. Promotes greater density.
Ferrovanadium	Refines grain (of value particularly in improving impact strength of hard irons).
"SMZ" Alloy	Converts normally hard iron into high-strength gray iron. Reduces chill. Improves strength and physical properties.

"Electromet," "EM," and "SMZ" are registered trade-marks of Electro Metallurgical Company.

UNDER present conditions, perhaps you can't get all the ferro-alloys you want in the grades you are accustomed to using. If so, it may be necessary for you to modify your practice to use alloys that are available. You may be able to substitute available standard sizes and analyses for special grades. You may be able to use a different combination of deoxidizers to achieve the same result. Or perhaps you can change the composition of your iron to take advantage of alloys that are available, and still obtain equally good physical properties.

With the knowledge gained through 35 years' experience in the manufacture and use of ferro-alloys, we may be able to suggest what you can substitute and how you can change your practice to

get the results you want. Our metallurgists can give you practical, on-the-job help. Ask for this service to help meet your ferro-alloy requirements. No obligation is involved.

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30 East 42nd Street New York, N. Y.

"Electromet" Ferro-Alloys and Metals are distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
Trade Mark
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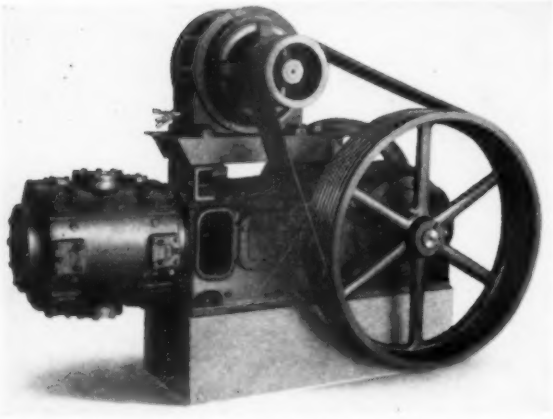
Valve Maintenance is vital to Compressor efficiency



Class T Horizontal Double-Acting Compressor with overhead motor mounting

INSPECT AND CLEAN VALVES REGULARLY

STRAIGHT valve lift without bending, rubbing or distorting... low discharge temperatures and low impact force resulting from low air velocities... lightweight valve discs of heat treated and ground stainless steel... stainless steel valve springs—all give CP Simplate Valves outstanding durability. They should, however, be inspected and cleaned at regular intervals, depending upon operating conditions. The precautions illustrated will help keep a compressor at peak efficiency and reduce maintenance.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP COMPRESSORS

At regular intervals, remove CP Simplate Valves for inspection and cleaning. Examine them carefully for wear. Carbon formation, resulting in leakage and excessive temperature indicates the use of either too much oil, or the wrong kind of oil.

When reinstalling a CP Simplate Valve, after inspection and cleaning, always make sure assembly is squarely on seat before putting on cover.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

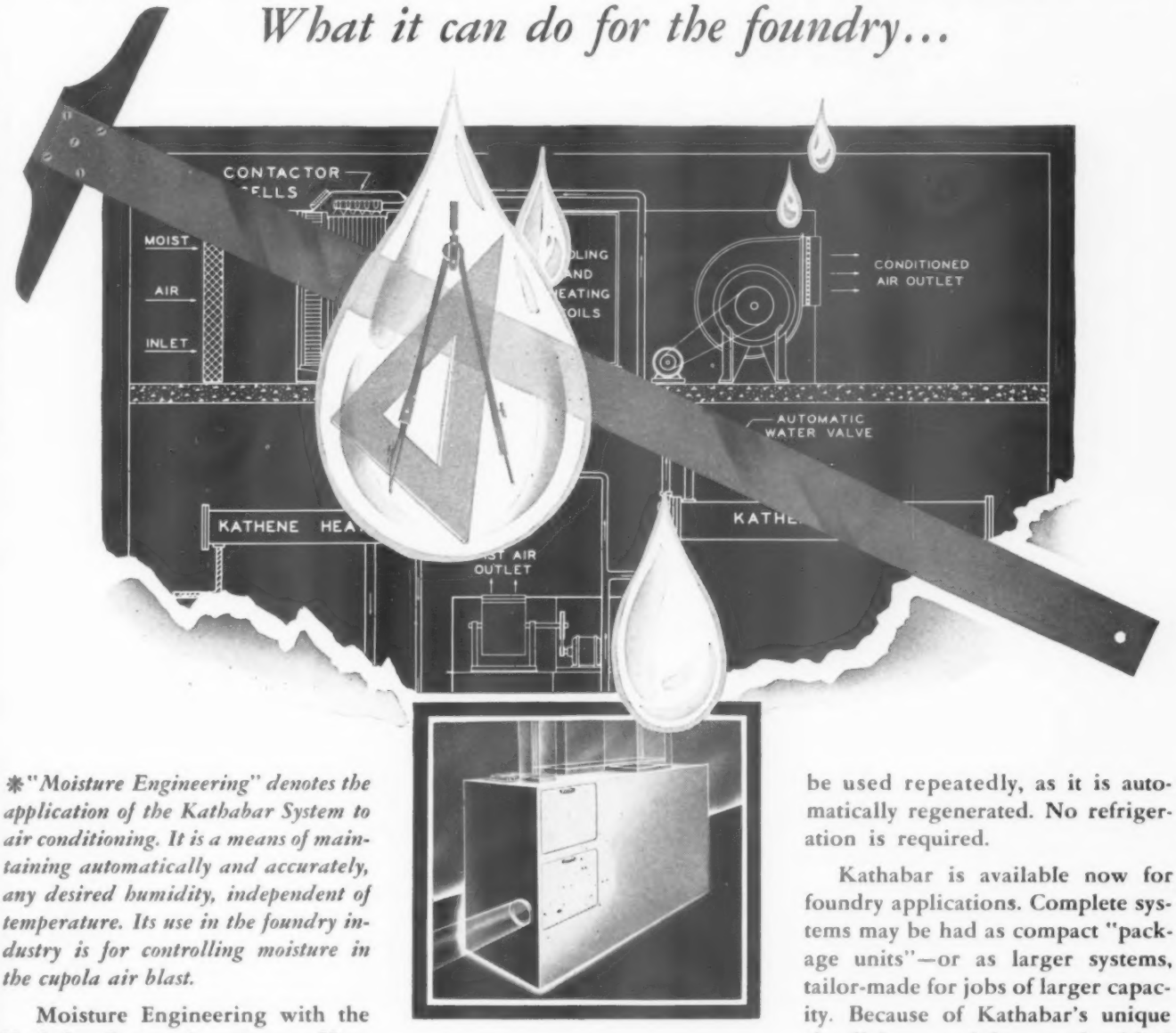
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York, N.Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

*MOISTURE ENGINEERING

What it can do for the foundry...



**"Moisture Engineering" denotes the application of the Kathabar System to air conditioning. It is a means of maintaining automatically and accurately, any desired humidity, independent of temperature. Its use in the foundry industry is for controlling moisture in the cupola air blast.*

Moisture Engineering with the Kathabar System is not new. Hundreds of installations prove its practical value. Its successful application extends to many varied fields... metals, munitions, foods, chemicals . . . to name a few.

In the metals industries, Kathabar has been applied to cupolas, as well as blast furnaces, to remove moisture from the blast and eliminate the almost hourly variable in the moisture content of the air. This has not only increased metal output and reduced fuel costs, but also improved the quality of the metal being produced.

The Kathabar System utilizes a chemical agent . . . a single salt solution which maintains desired humidity by removing or adding moisture to the air. This solution is odorless and harmless. It can be used repeatedly, as it is automatically regenerated. No refrigeration is required.

Kathabar is available now for foundry applications. Complete systems may be had as compact "package units"—or as larger systems, tailor-made for jobs of larger capacity. Because of Kathabar's unique simplicity, a minimum of critical materials is used in manufacture.

If you wish to learn more about how ordinary, day-to-day humidity interferes with cupola operation write for a copy of the 16-page illustrated study, "The Effect of Moisture in the Manufacture of Metals".

Surface Combustion Moisture Engineers will be glad to discuss your moisture control problems with you.

SURFACE COMBUSTION • TOLEDO, OHIO

Manufacturers of SC Industrial Furnaces, Janitrol Space Heating Equipment and Kathabar Humidity Control Systems

SC Kathabar System of HUMIDITY CONTROL

ADVANCED AIR CONDITIONING

KC-5

Osborn moulds "innards" for the mighty jeep

THE army's little quarter-ton reconnaisance-combat cars, affectionately known as "jeeps" both in and out of the service, are rolling up a performance record without parallel in the history of motor transport.

Jeeps have slogged through arctic mud and snow, licked the tangled swamps and Japs of the South Pacific, routed the enemy from mountain top and desert alike in Africa.

Jeeps have carted guns and men and munitions over terrain that would balk a mule. They've helped fish damaged planes from tropical lagoons. They've herded Axis prisoners and switched foreign freight cars.

Tough is the word for the jeep. And that toughness is built into the jeep's every bushing and bolt, every fitting and flange. Shown below are differential case, bearing caps, steering gear housing, windshield brackets, spring bumper mounts and other cast parts that contribute to the jeep's toughness.

Osborn is proud that many of these tough, accurate castings are being precision-moulded in large quantities on Osborn Moulding Machines.

THE OSBORN MANUFACTURING COMPANY

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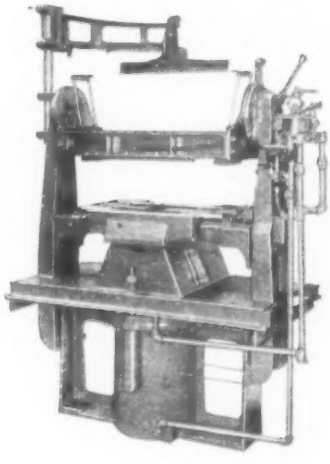

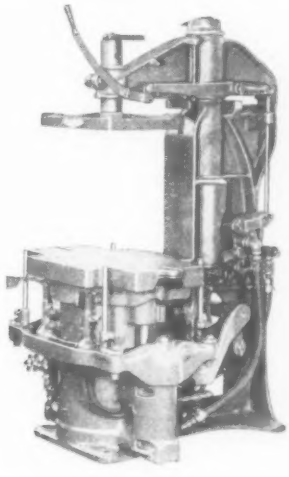

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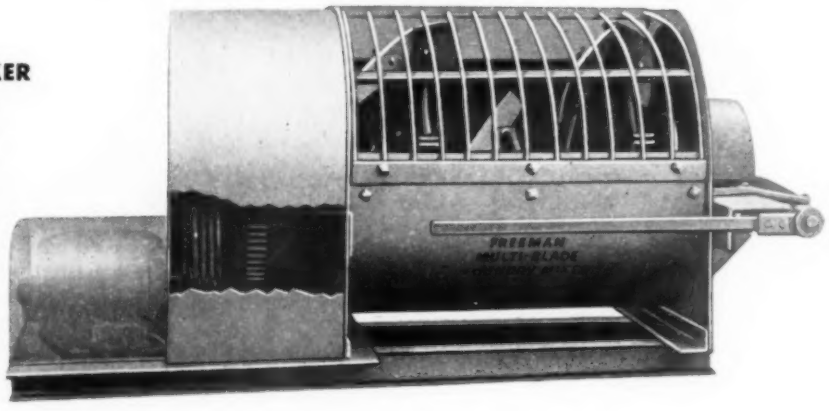

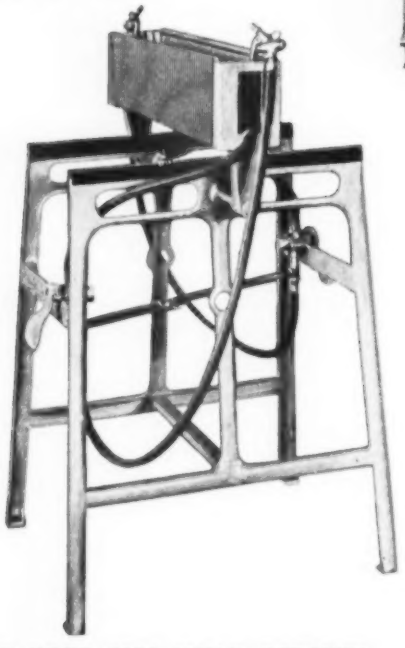

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Industry Needs WPB Section Devoted Entirely To Problems of Castings

FOUNDRIES continue to be confronted with many difficulties because the War Production Board has not recognized completely the importance of castings in the manufacture of the machines of war. Production problems of the industry still are being handled in conjunction with those of unrelated products, with the result that full utilization of the foundry capacity of the country has been delayed, and difficulties of individual foundries have been aggravated. For example, production problems of the ferrous divisions of the foundry industry have been in charge of the Forgings and Castings Section of the Wire and Heavy Products Branch of the Steel Division of the War Production Board. Is it any wonder that certain of the other war agencies handling procurement of materials, including castings, are not familiar with this castings organization which is stuck off in one corner and then is only partly concerned with foundry problems? With this type of setup, where the foundry industry shares facilities far down the line with another industry, policy making for the Steel Division may be too far removed from those laboring with foundry problems.

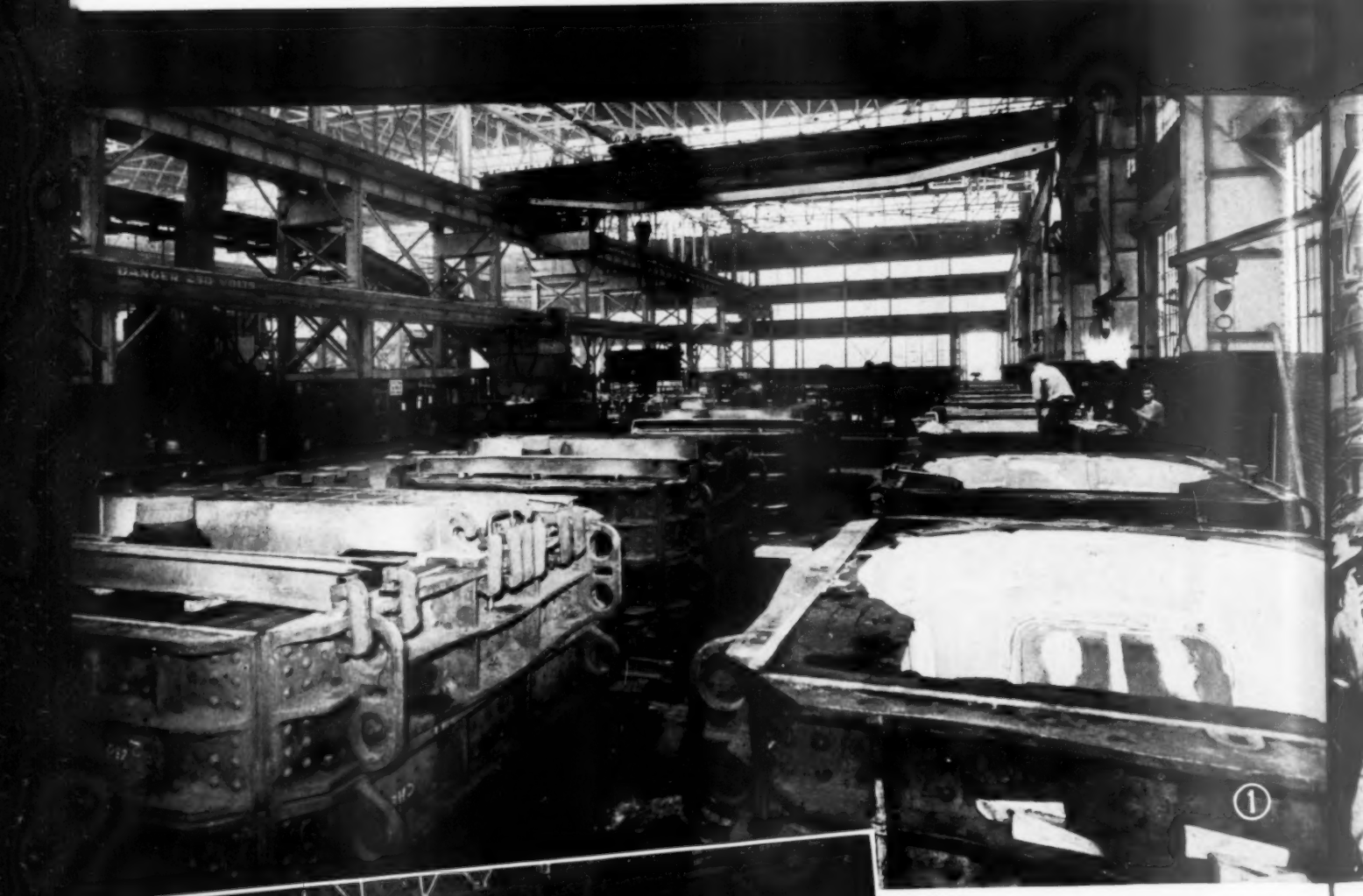
Since the first of the year a new force has been dealing with technical and engineering problems of the major ferrous foundry fields. In February, the Metallurgical and Conservation Branch of WPB, under the direction of H. J. French, branch chief, organized the Foundry Industry Advisory Committee for the purpose of considering the various problems pertaining to the conservation and use of foundry raw materials. Recently four technical groups have been organized by the branch to work with the Foundry Industry Advisory Committee. These technical groups are headed by experienced and recognized metallurgists in the fields of gray iron, malleable iron, steel and heat and corrosion resistant products. These groups now are studying specific problems pertaining to the further development of particular types of castings, and the results of this work should prove of mutual benefit to government and industry.

Organization of the Foundry Industry Advisory Committee and the technical groups has been a distinct service to the foundry industry by providing needed machinery to handle pressing problems. Credit for much of the organization work of this committee should go to Don J. Reese, chief, Iron and Steel Manufacture Section, Metallurgical and Conservation Branch, WPB, who recently was named government presiding officer for the Foundry Industry Advisory Committee. It is interesting to note that the establishment of this committee consummates the first step in a program recommended by THE FOUNDRY in the November, 1941 issue. The suggestions made at that time embraced not only an overall committee for the entire foundry industry, but also official subcommittees to deal with problems in the gray iron, steel, malleable iron, brass and bronze, and aluminum and magnesium divisions of the industry.

Many difficult problems still face the foundry industry in the phase of war production which lies ahead. To meet these problems in the most satisfactory manner, steps now should be taken by the WPB to divorce the work in connection with castings from that of other practically unrelated products. A separate section, devoted entirely to the foundry field, should be organized under the direction of a man completely familiar with the many ramifications of foundry production. The organization should be built around the experts already in the WPB, but this force should be augmented from the foundry field to provide sufficient manpower for the job. A committee setup, similar to that previously recommended by THE FOUNDRY, could be provided by combining the committees already functioning under the several WPB branches, and by filling in the remaining gaps.

Such an organization would eliminate misunderstandings and much duplication of effort on the part of both government representatives and foundrymen. But more important, it would provide the solution for many foundry problems to the end that maximum efficiency would be assured in meeting the needs of the nation at war.

Frank G. Steinebach
Editor



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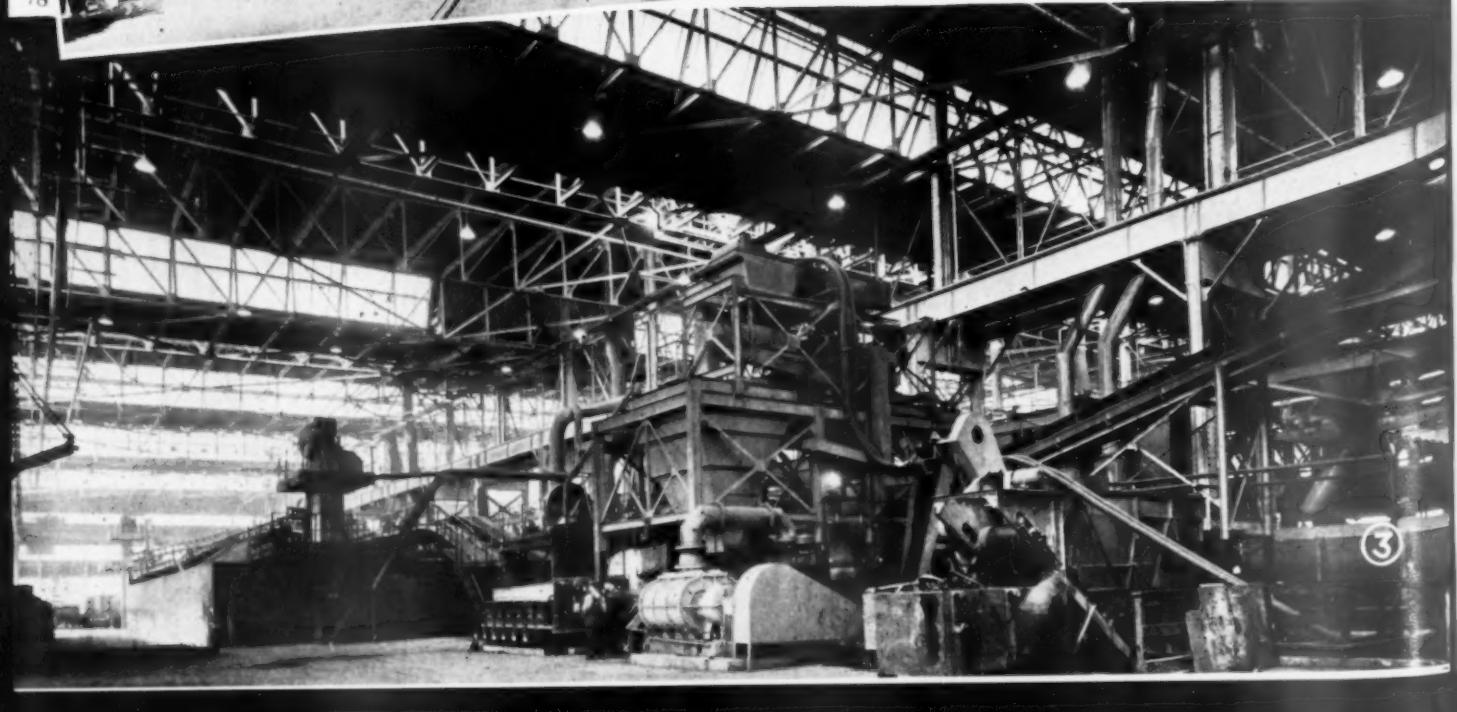
American Steel Foundrie



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Casts Armor for Tanks

By Frank G. Steinebach

WAR has brought tremendous demands for steel castings, and consequently has necessitated a very substantial increase in the capacity of the steel foundry industry of the United States. As a part of this expansion program, one of the largest and finest steel foundries in the world recently was built and placed in operation in Northern Indiana to produce cast steel armor and other steel castings needed in the manufacture of various types of war materiel.

The new plant was financed by the Defense Plant Corp. to the extent of $26,500,000, and has been leased to the American Steel Foundries for operation. The foundry, which provides 30 acres of floor space under one roof, is located on a 93-acre plot of ground in East Chicago, Indiana, and is adjacent to the Indiana Harbor Works of the American Steel Foundries, which also is operating entirely on war work.

Fig. 1—Turret molds being finished and clamped for pouring. Fig. 2—After the turret mold is rammed on the slinger, it is placed on uprights for finishing. Fig. 3—A portion of the used foundry sand is washed in a hydroblast unit. Fig. 4—Equipment for making turret and other large cores

An enviable record was established in constructing and equipping this enormous steel foundry. When the American Steel Foundries first was notified by the Tank and Combat Vehicle Section of the Army Ordnance Department that a greater tonnage of cast armor would be required monthly than was being produced by that company in existing facilities, a new foundry was considered advisable, and plans were drawn. Before this work was completed, the original requirements for the new plant were doubled, and when the new plant was started the original tonnage requirements had been increased four times.

Ground was broken for the new cast armor plant on March 3, 1942, and the erection of structural steel was started on April 29. From June to September the production buildings were completed, the mechanical and electrical equipment were installed and the foundry equipment was installed in the first unit of the plant. The open hearth furnaces were lighted on Sept. 16, and by Sept. 28 the foundry and core

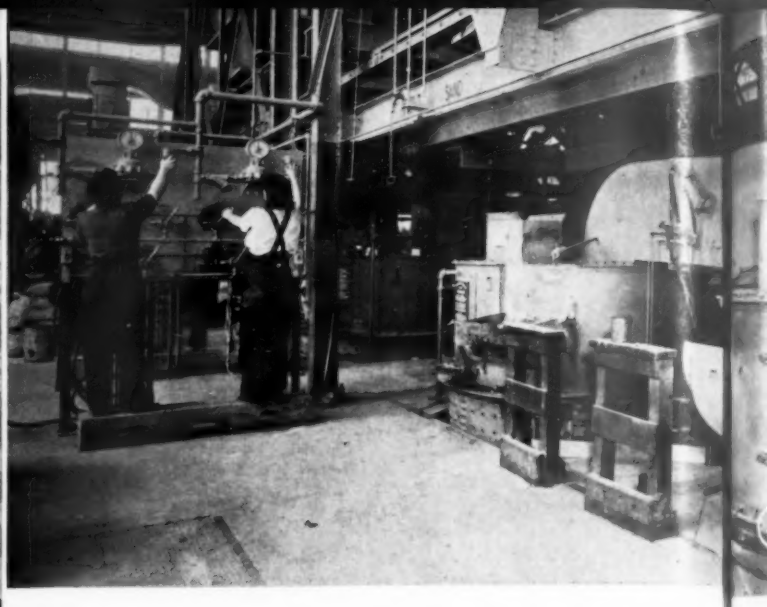
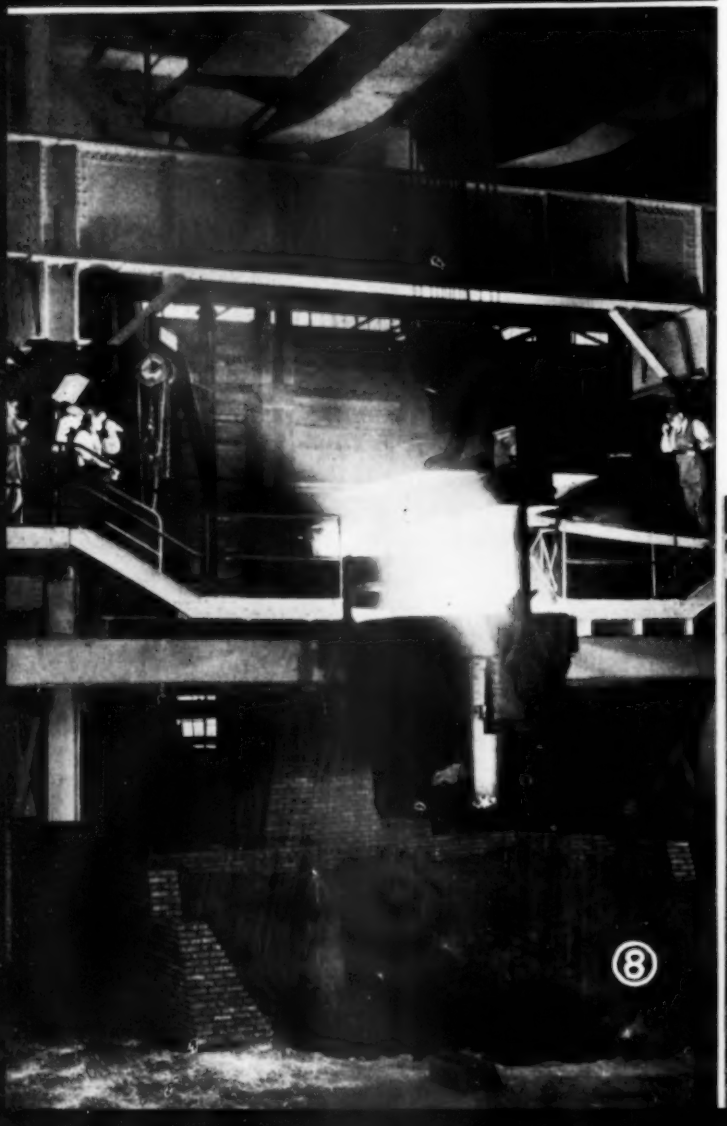
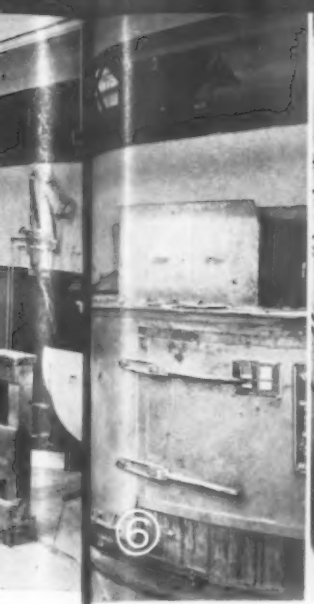


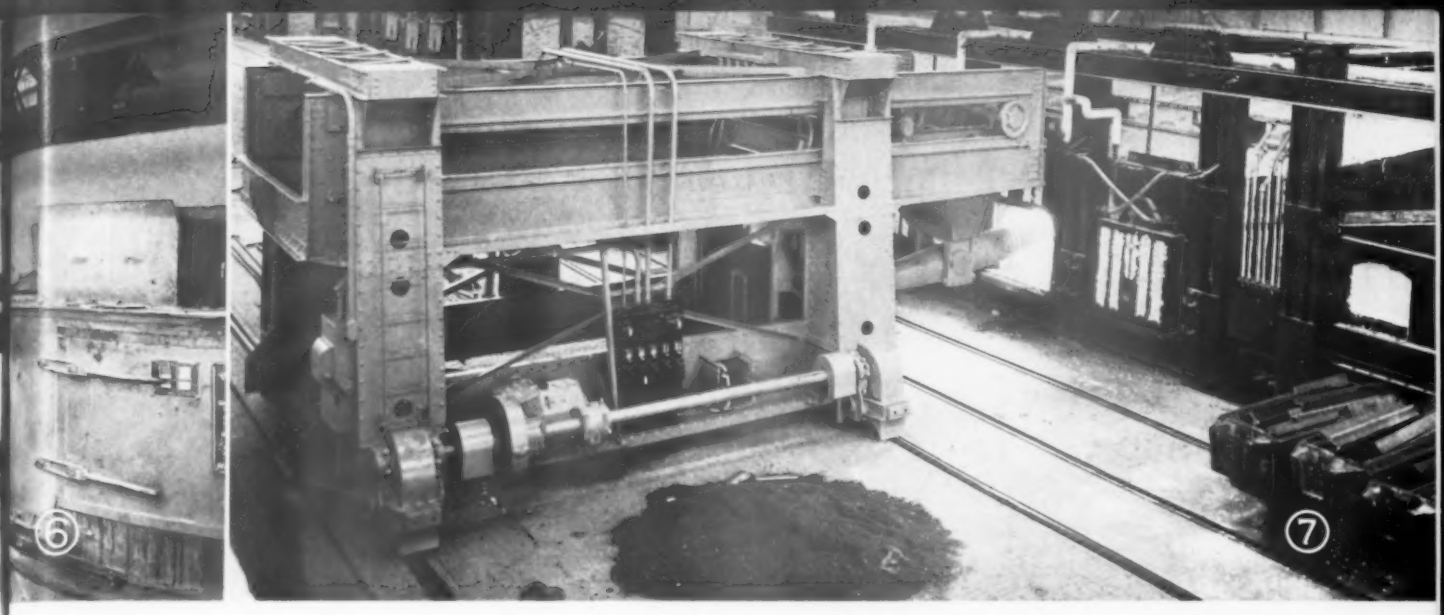
Fig. 5—Pouring a turret casting. Fig. 6—Women operate the equipment controlling the mixing of core and molding sands. Fig. 7—Equipment for charging the open hearth furnaces. Fig. 8—After being melted and refined, the metal is tapped into 30-ton, bottom pour ladles. Fig. 9—A special rig is employed to cut the riser from the turret castings. Fig. 10—After normalizing, the castings are shot blasted and then chipped



room were in operation, and the cleaning and finishing departments were ready. The first steel was poured on Oct. 1, 1942, less than 7 months after breaking ground, and at that time the buildings were within 80 per cent and the equipment within 65 per cent of completion. The foundry now is complete and in operation.

Sand preparation, core making, molding, pouring, shakeout and a portion of the cleaning operations are handled in the main foundry building, a huge structure approximately 1600 feet long, 260 feet wide and in the neighborhood of four stories high. The melting department is contained in an extension along the front of the building which is 600 feet long, 94 feet wide and the same height as the remainder of the building. Cleaning, heat treating, finishing and inspection departments are located in two extensions which run at right angles to the main building. One extension is approximately 170 feet





wide, the second is double that width, and both extend 960 feet in the rear of the main building.

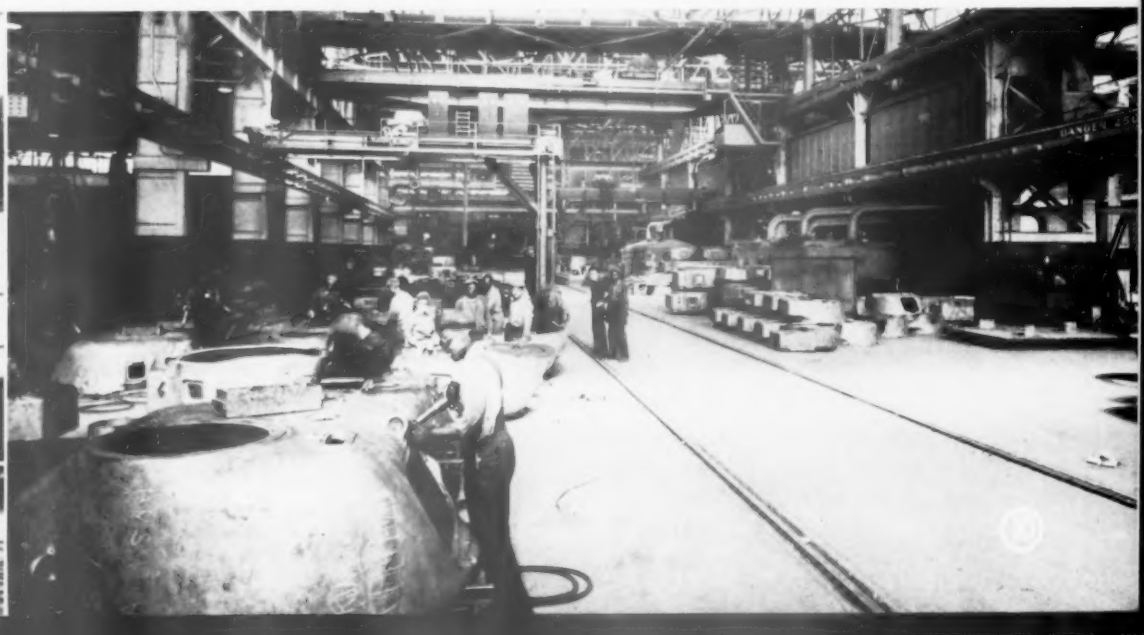
The design of the building is unusually modern and provides a striking appearance to the general run of foundry buildings. Three rows of continuous windows completely surrounding the building and windows around rectangular raised sections of the roof provide exceptional light and excellent ventilation. The striking appearance of the plant is enhanced further by the six large tile stacks evenly spaced along the front of the open hearth department, and by the beautiful office building located at the righthand corner of the plant property as you face the front of the plant. The plant faces north along an east and west highway.

The main plant, which faces north, is divided into three bays longitudinally by two rows of roof supports placed 30 feet apart. The two outside bays are 86 feet wide and the center bay 88 feet. Each bay is serviced by four or five traveling cranes which can travel the full length of the building, and with jib and gantry cranes for special stations or sections of the plant, depending upon the type of operations to be performed. The front or north bay has been designated as No. 1 foundry and is devoted to pouring operations and to the molding of the heavier types of castings. The middle bay is the No. 2 foundry and is devoted to molding of smaller and certain special castings and to core making operations for the entire plant. The third or south bay is called the No. 3 foundry and is used for sand storage, sand preparation, sand washing and a portion of the cleaning operations.

The plant has been designed to provide duplicate equipment and facilities for all operations. An imaginary line from the front at the north to the rear at the south divides the plant into two sections, with the equipment in one section duplicating that in the other half of the foundry. Therefore, in the discussion of the flow of materials and the sequence of operations, the details presented will be limited chiefly to that half of the plant located to the west.

Raw materials, including sand, pig iron, scrap iron, ferroalloys, etc., are received and stored in extensive yards located in the rear of the foundry on the east side of the plant property. Sand is loaded into company railway cars and is delivered by rail inside the building at the west end of No. 3 foundry. The sand then is unloaded by overhead crane into a large storage bin, or directly onto the large hopper which feeds the sand drying unit. This sand dryer has a capacity of 15 tons per hour.

After being dried, the sand is discharged into a pit and then is carried by elevator and belt conveyor to the dry sand storage bins. The bins are equipped with hatches which are used to control the amount of sand delivered to the sand hoppers located over the four sand mullers.



This sand again is handled by an elevator and belt conveyors. These sand hoppers are split at the bottom so that sand may be directed to two sets of weigh lorries suspended from parallel tracks above the sand mills. The lorries are moved about under the hoppers and the proper amounts of used, washed and new sand required for the particular sand mixture are deposited in the lorry container.

After the desired mixture has been made up, it is discharged into the proper muller, the fines are blown out (the mullers being completely hooded), and the water is added. After mixing briefly, the binders needed for the particular mixture are added. Bonds used at this plant include bentonite, cereal binders, rosin binders, and oil binders. Bond for the core sand mixtures is measured by bulk, while the bond for the molding sand mixture is weighed. Four mullers are employed for mixing sand for this unit, which includes one half of the foundry, and, as previously mentioned, the entire sand mixing unit is duplicated at the opposite or east end of the No. 3 foundry. Two of these mullers are used for mixing core and facing sands and the remaining two are employed in preparing molding or backing sand.

To the visitor starting through this plant, the one factor which quickly comes to attention is the extensive use of women. To meet the problem of securing a sufficient supply of labor to operate the foundry at a rate dictated by war demands, the management of the American Steel Foundries has used women in many jobs which previously were handled only by men. For example, women drive industrial trucks, operate cranes, make cores of all sizes, control heat treating operations, weld, and perform many other jobs throughout the foundry. Women handle almost entirely the preparation of molding and core sand, control the (*Please turn to page* 172)

Fig. 11—*Housings at the second chipping station, following heat treatment and the second shot blasting. Fig.* 12—*A well equipped pattern shop is located in a wing at the west end of the main foundry building. Fig.* 13—*Special furnaces are used for normalizing and heat treating*

EDUCATION and the Gray Iron Foundry

By W. W. ROSE
Executive Vice President
Gray Iron Founders' Society Inc.

IN THE era of social reform which preceded but, I hope, did not incite the present one of mortal combat, institutions of learning came into the limelight through the widespread borrowing of members of their professional staffs to occupy prominent positions in government. As is usual in transactions of that nature a fair number of those professors borrowed were not repaid and the Phi Beta Kappa key is still prominent on the well fed—shall we say bosoms?—of those occupying swivel chairs in the marble halls where reside those guiding our war effort. For this reason, if for no other, the gray iron foundry industry has become increasingly interested in purveyors of education and what they sell.

In the March *Transactions* of the American Foundrymen's Association there is reproduced that most excellent paper by Dean C. J. Freund of the University of Detroit delivered at the 1942 annual convention in Cleveland. It is an extremely interesting and timely discussion and he takes the foundry executive over his knee in good fashion, far better than I could do. But I want to point out that the learned Dean has two knees and might expose the hypothetical foundry executive's posterior on the other knee also.

To be explicit, there is a crying need to utilize the benefits of technical knowledge not only within the gray iron foundry but outside it as well so that the world may have the benefits of knowing what it can produce by reason of the purchasing agents and designing engineers of the future being made aware of it.

The industry is a curious phenomenon. It is composed of about 2850 plants scattered throughout the length and breadth of the land. With the exception of a few manufacturers' or "captive" foundries which could almost be counted on one hand, the plants are very small compared with the giants many of them serve. This multiplicity of plants, coupled with the weight of their product, has caused them to be largely local in the area they serve and they are found, for the most part, clustered, (sometimes "cluttered"), around centers manufacturing a specific product or products. This tends to breed a parochial outlook. You doubtless recall from your nursery days the little red hen who thought the barnyard was the world.

A little frog in a big puddle doesn't breed a superiority complex, so there were many in the trade who became pessimistic, thought they belonged to a dying industry, couldn't make any money anyhow and besides—like the little red hen—they were entirely local. You couldn't get any statistics out of them for love nor money, nor any interest in themselves as a great industry. They didn't, and many do not even now, know that in the aggregate they are a sleeping giant of huge proportions who, if they will pool their pennies, can awake, be a power in the land and, as other industries have before them, finance and foster the educational programs necessary to progress in this fast moving world. Should sleep continue, they must die, but there are distinct signs of awakening.

However, the point I desire to emphasize is that when we speak of foundry *education* it should not stop at the education of those who intend to make the foundry their life work, but should extend the market so that the latter may be alive to what the industry can do for it.

Responsibility for the education of the producers of castings is shared jointly by such technical associations as the American Foundrymen's Association and the technical schools. The education of the *market* lies in the dual lap of the trade association and such schools, and I may say in passing that the technical association has, to date, done a far better job than the trade association, largely because the foundrymen themselves have failed to recognize the importance of the latter.

Did you ever stop to think what would happen if, by some magic, gray iron castings should suddenly turn into thin air? Let us have a look at such a world.

First comes the farmer who raises what we eat. Practically every implement he uses to prepare the ground, plant, cultivate, reap and process the crop would fall to pieces and be unusable were our castings removed.

Next in importance to food comes clothing. Examine the spinning machines, the looms, the cutting and sewing machinery, shoe, glove and hat machinery; remove gray iron castings and picture to yourself how long you would have to make your present wardrobe last until some other material to replace gray iron could be devised and put into play.

Shelter comes next in man's necessity. Of course people have lived and could again exist in dugouts. But take the modern house with plumbing, hardware and heating parts of gray iron, would it not present a sorry picture were these castings suddenly to disappear?

All that we use, both solid and liquid in the mineral kingdom, comes from the ground. Could you imagine what mining and drilling machinery would look like minus gray iron castings or the land, sea or air transportation without them?

Take the steel industry without ingot molds, rolls or frames for its machinery, the machine tools to finish its products, would it not be a (*Please turn to page* 186)

A talk delivered at the annual meeting of the American Foundrymen's Association held at St. Louis, April 28 to 30

FOUNDRY METALLURGY *in the* CASTINGS INDUSTRY

By John W. Bolton

The Lunkenheimer Co.
Cincinnati

PROGRESS in the art and science of foundry metallurgy during the period between the great world wars has been rapid, and accelerative in rate. This has been reflected in quality of product, economy of manufacture, engineering application and in the competitive position of the industry.

The dictionary defines metallurgy as "The science and art of extracting metals from their ores, refining them, and *preparing them for use*." Foundry metallurgy is the science and art of preparing metals for usage in engineering structures through the medium of casting processes. As such it is concerned with the selection of raw materials, their melting, casting, and treatment, both incidental and subsequent, to the point of fabrication beyond the cast form. By the term casting is implied study and control of gates and risers, the sand or other media and other related phases of the foundry art. By the term incidental treatment is implied such procedures as inoculation, duplexing, deoxidation, and so on. By the term subsequent treatment, such operations as heat treatment are inferred, including repair welding, to the point of fabrication by machining, assembly welding or the like.

The metallurgist uses various general sciences such as physics and chemistry, and also more specialized branches of science, for example metallography. He also uses or adapts many arts. Most foundry problems resolve themselves into the interrelationships of three factors, namely composition, temperature and time. Time (more specifically, rate of reaction) is the least understood of these factors, hence highly promising for future study. To these may be added the problems of mechanics, pressure, flow, and other related matters.

Materials handling or transportation, the direction and management of labor, and other factors of the sort are aside from foundry metallurgy as such. The economic aspects of such factors are well realized by management, and great importance rightly is attached to them. Too frequently it is not realized that foundry metallurgy also has economic significance, and is in the long run a sound basis or starting point from which to build up a truly integrated foundry business, and a strong industry.

The ultimate objective is to provide a suitable material of construction at a price which will permit successful competition with other materials of construction. It should be realized clearly that the foundry sells service per dollar rather than pounds of castings. Serviceability of the material in the casting is determined by the foundry metallurgy behind it. For given serviceability of material in a casting, foundry metallurgy often affords a number of approaches. Among these, choice can be made on the basis of cost or economy.

An objective review of the status of gray iron metallurgy, and of the degree of acceptance of gray iron as a worthy engineering material, indicates two things quite clearly:

First, in real competition, it must be sold on its merits —on the service per dollar basis rather than on a pounds per dollar basis. Second, practical improvement and scientific elucidation have gone rather closely hand in hand —a trend that probably will continue.

Gray iron has been improved in reliability, uniformity, and range of properties available. Much is known about its useful, and, for some services, unique, engineering

JOHN W. BOLTON

"Foundry Metallurgy in the Castings Industry" comprises the first Foundation Lecture of the American Foundrymen's Association and was presented in condensed form at the association's annual meeting in St. Louis, April 29. Purpose of the Foundation Lecture is to bring authoritative presentations of various problems of the castings industry before the association membership. The accompanying text—first of three installments—discusses metallurgical developments in the gray iron foundry industry. John W. Bolton, who was invited to present the 1943 lecture, is in charge of metallurgical research and testing for the Lunkenheimer Co., Cincinnati

characteristics. The actual properties of the metal in castings (as opposed to test bar data) have been studied to a degree not exceeded and perhaps not equalled in the case of other metals, cast or wrought. Excellent specifications are available from which the consumer can prescribe safely and surely.

Despite this, there remains considerable prejudice against gray iron. The terms weak, brittle, unreliable and the like still are applied to it by many uninformed engineers. Unfavorable presentations are contained in some handbooks and other publications. Gray iron has not gained the confidence and trade acceptance that it merits.

This branch of the castings industry is far the largest in tonnage production, it has the greatest number of units, and product applications are greatly diversified. Until recently it has not been very well coordinated; also, it has not been distinguished by being articulate. Ease with which melting can be conducted and with which reasonably sound gray iron castings can be made has not been entirely fortunate. Many could "get by" without technology. To make high quality metal to rigid specifications requires much in the way of foundry metallurgy and control. It is not merely a question of the best material, but the best material at the least cost. Anyone can make an article cheaper; anyone can improve its quality. The art lies in combination of these achievements.

Gray irons are a different and in several respects a more complex series of alloys than cast steels, principally because of the formation and presence of an additional and significant structural component, flake graphite, which is formed during the initial casting process.

In the case of cast steel a valuable heritage is available from the studies of wrought steel. This has lessened the amount of pioneering research needed, and often has enabled cast steel foundrymen to take advantage of adaptations. In contrast, the gray iron industry has had to work out most of its own metallurgical problems.

Twenty years or so ago emphasis was on composition. Chemical analyses had displaced the older methods of judging by fracture. Great stress was laid on percentages of combined carbon, silicon and sulphur, some on phosphorus and manganese, and little or none on percentage of total carbon.

Subsequent metallurgical progress has followed several fairly well defined lines, as follows:

(1) Study of the general relationships of structure to mechanical properties.

(2) Determination of the significance of total carbon content.

(3) Study of how factors beyond mass and silicon content (and the usual "elements") may influence structure and mechanical properties.

(4) Classification and specification of irons according to section and strength properties.

(5) Study of mechanical characteristics and their interrelationships beyond the transverse test and the infrequent tensile tests of twenty years ago.

(6) Developments in the techniques of sand control, melting, molding, heat treatment, etc., and of new and improved testing methods.

Beyond a few worthy exceptions, little has been done to gather and make public (*Please turn to page* 180)

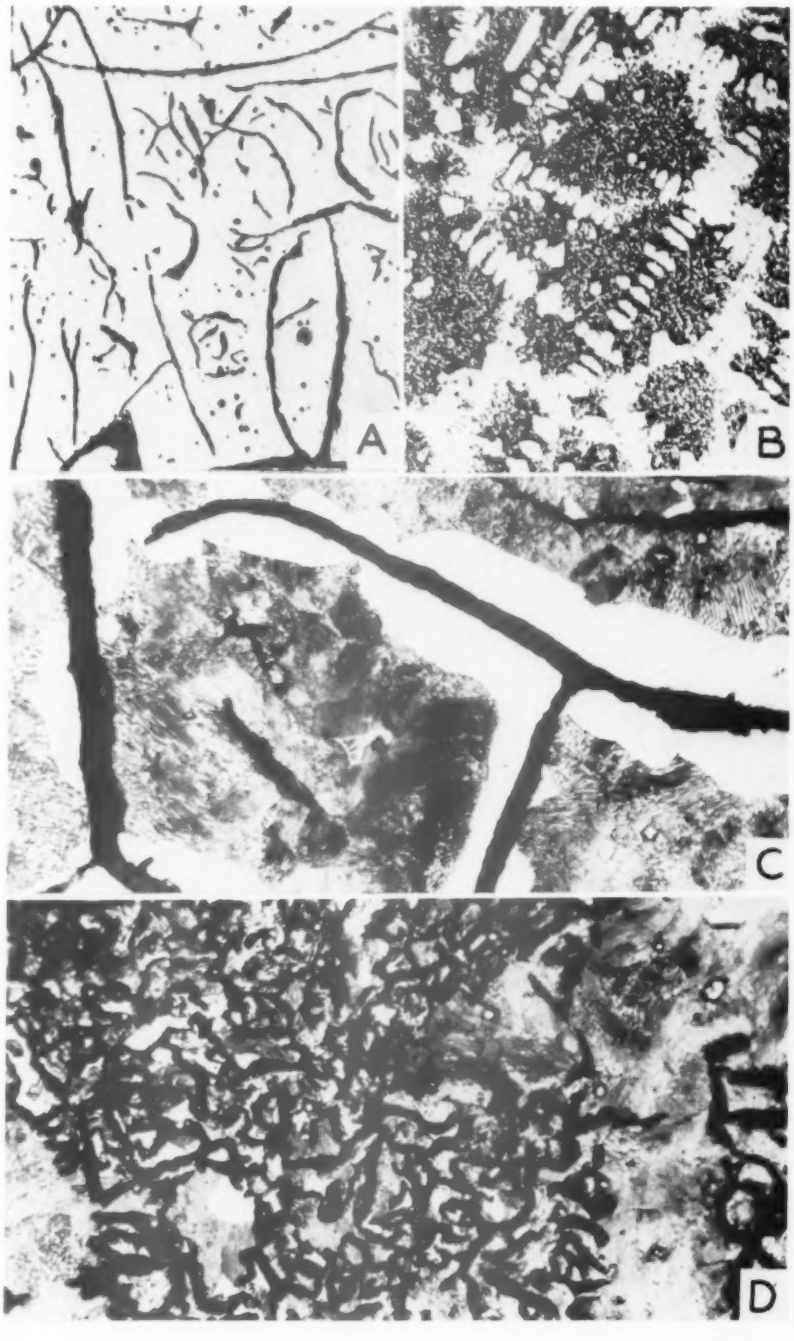
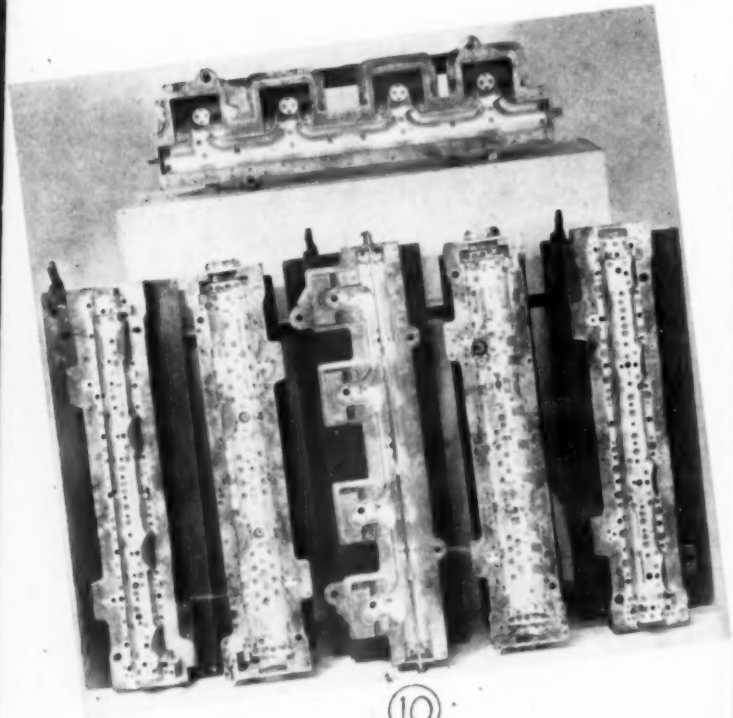


Fig. 1—(*A*) *Typical pig iron structure,* 100 *diameters unetched;* (*B*) *Modified pig iron structure,* 100 *diameters unetched;* (*C*) *Typical pig iron structure,* 500 *diameters etched;* (*D*) *Modified pig iron structure,* 500 *diameters etched*

Fig. 9—Individual cores and assembly showing uniformity obtainable in cores made on a blower. Fig. 10—Examples of core boxes for blowing, illustrating time saving possibilities by this process. Fig. 11—Cores made from boxes shown in preceding figure. Fig. 12—Various types of small intricate cores made by blowing. Fig. 13—Pin cores made in gang boxes using blowing method. Blowing plate (A) can be used on any box that will cover opening in plate. Cores blown in vertical position. Fig. 15—Set of water jacket cores for diesel cylinder head after 2-years' use during which about 100,000 pieces were blown

(9)



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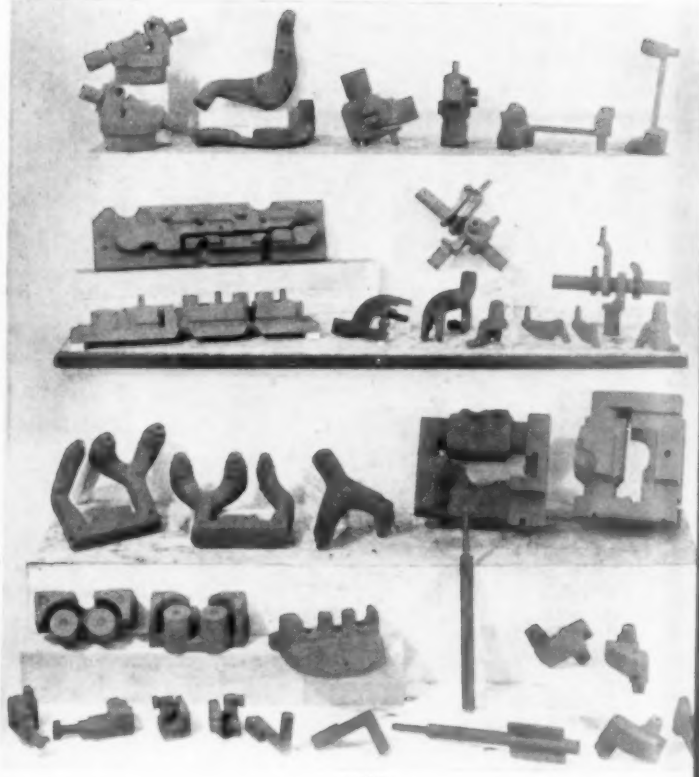

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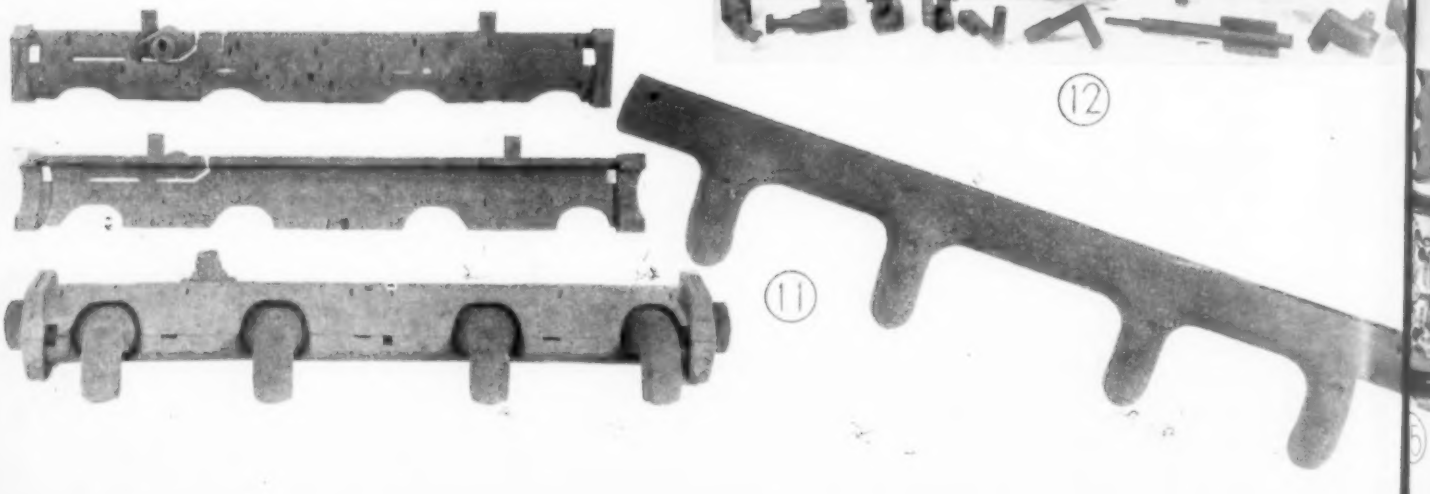
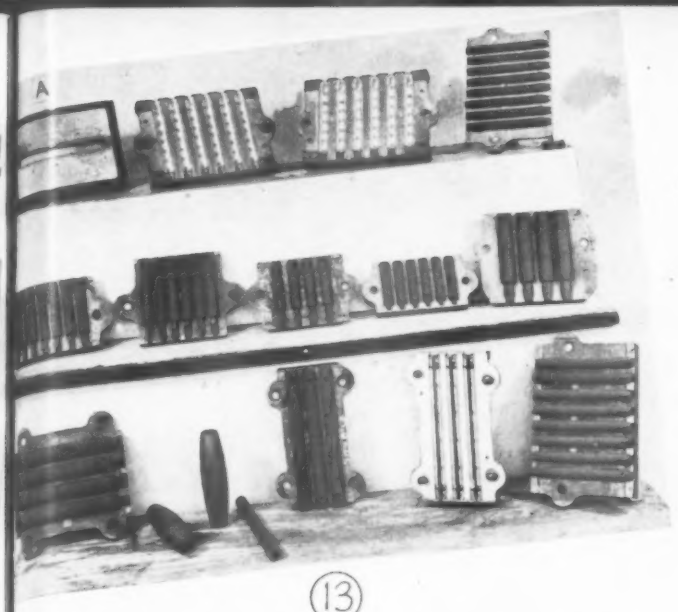


(11)



(13)

Core Blowing IN A SEMI-PRODUCTION FOUNDRY

By Z. J. MADACEY
Caterpillar Tractor Co.
Peoria, Ill.

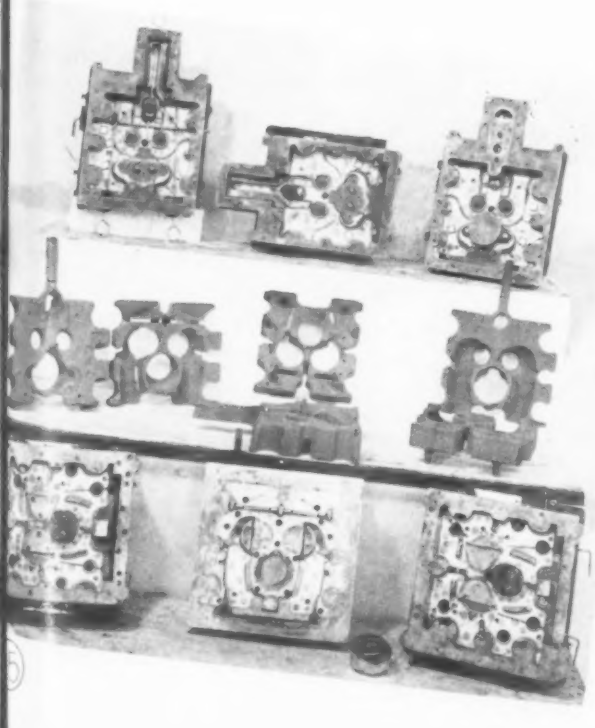


FIG. 9 is shown to emphasize the uniformity obtainable in cores made on a blower, particularly in relation to sagging. These cores, when assembled, form the main body of a 6-cylinder diesel block. Each core is 28 inches long, 13 inches wide and varying in height from 3 to 8 inches. There is a ⅛-inch finish on all main bearing faces and ⅛-inch on each side of the cylinder bores.

After baking, the cores are not rubbed to fit, but are placed directly on an assembly gauge and bolted together. Due to the small amount of finish allowed there must be a complete absence of distortion. For example, if each of the 12 cores sagged 1/64-inch, the completed assembly unit would be 3/16-inch too narrow, with the result that the outside bore and main bearing would be 1/16-inch under specified requirements. Actually in our practice the distortion which resulted in the various cores is so slight it is hardly measureable.

Examples shown in Fig. 10 were brought together purposely to emphasize the tremendous amount of time that can be saved when blowing cores of this type. Unfortunately, the size and shape of loose pieces attached to these plates are rather hard to distinguish. Advantages to be gained when blowing cores of this type can readily be seen when considering the amount of ramming that is eliminated on a core 40 inches long and ½-inch thick.

The question often asked is, "Why are the blow-holes in this example situated so closely together?" When the sand enters the box these holes serve two purposes. First, they hold the wire intact on stools provided for them as the blow-hole is situated directly above them, and, second, one blow-hole counteracts the sweeping action of the others above it. This example brings out the fact that blow-holes are not always used merely to blow sand into the box. If the blow-hole is not used to hold wire in position when the sand enters, some other means must be employed. When it becomes necessary to use stools for this purpose the impression which is made must be plugged with a patching sand or mudding compound.

Cores pictured in Fig. 11 were made in the boxes shown in Fig. 10. It is readily seen how intricate these cores are and the amount of time that would be required to make them on any other type of machine than a blower. When they are blown, they come out so close to correct size that no additional work is required, such as filing, fitting, etc. They are placed in a rubbing gauge and a 1/16-inch cut taken off the joints before they are delivered to the foundry. By the hand method, however, these cores frequently would require some dressing and fitting in order to be satisfactory for foundry use.

Up to this point, we have been concerned in this discussion with large cores only. Fig. 12 shows a group of the smaller, more intricate cores. This selection will give a general idea of the variety of small cores that can be successfully blown. All pin cores, with the exception of a very few, can be blown in a vertical position. Both

This is the second and concluding installment of a paper presented at the annual meeting of the American Foundrymen's Association held at St. Louis, April 28 to 30

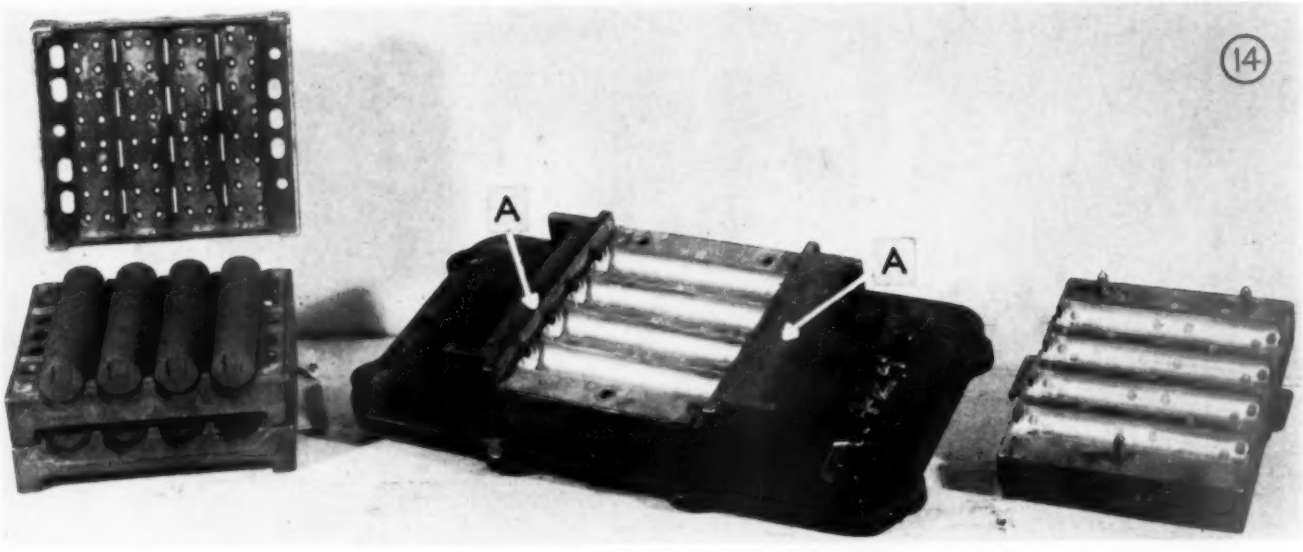


Fig. 14—Cores similar to those of Fig. 13 but blown in horizontal position. Sand chambers (A) of box are hollow with holes corresponding to holes in plates to which the box is attached

vertical and horizontal clamps are used. The blow plate used does not have holes corresponding to individual cores. The length and width of the single elongated blow-hole depends on the length of the box and the diameter of the core. The plate shown at (A) in Fig. 13 can be used on any core box that will cover the opening. The number of cores or their diameter is of no importance.

The method of blowing shown in Fig. 14 is identical to blowing the pin cores of Fig. 13. The pin core is blown in a vertical position from one end and the core in Fig. 14 is blown in a horizontal position from both ends. Sand chambers on both ends of the box (A) are hollow and there are corresponding openings in the plate to which they are attached. Steel bushings are inserted in the chamber with a break-off pad underneath. These pads are more easily distinguished on the core. The driers are constructed to stack and interlock, thus conserving oven space.

Approximate life of a corebox used on a core blower as compared with one used in hand making seems to be a question most often asked. The degree of skill applied when rigging a corebox will naturally determine the maintenance required to keep it in operation. It is advisable for beginners to start with the more simple type of corebox, for if an error must be corrected, it is then not a costly one. Additional experience is acquired with the rigging of each box and it is not long before the observant supervisor is capable of doing a first-class job . Fig. 15 is an example of a set of water jacket core boxes for a diesel cylinder head. For about 2 years these boxes were used on air jolt hand roll-over machines. Then they were rigged for the core blowers. These boxes have now been in use about 2 years, and approximately 100,000 pieces have been blown. The condition of the cores and boxes in this example indicate that they will serve the purpose for several thousand more pieces.

In recent months many foundrymen have been concerned with the production of aluminum air-cooled cylinder heads. Caterpillar Tractor Co.'s foundry personnel became interested in the possibility of blowing the cores for these castings. A complete set of patterns and core boxes was secured and experiments started. Although we were successful in our efforts, anyone familiar with core blowers can readily see the problem we were undertaking. Numerous experiments were carried out day after day.

The first consideration was the minimum amount of wear on the pattern itself, the object being to obtain very much the same results that we would get by either throwing the sand between the fins or jolting the sand between them to the required hardness. A sheet wax model was made, molded to the shape of the pattern, which in turn was used to make an aluminum casting to which we will refer as the jacket. This jacket was fitted to the pattern with a 1-inch clearance around the extreme bottom, ¼-inch clearance over the entire fin area, and the contact points were held under 0.004-inch to eliminate any possible leakage.

Sand was blown through ⅛-inch elongated blow-holes, cut in the jacket in such a way (*Please turn to page* 185)

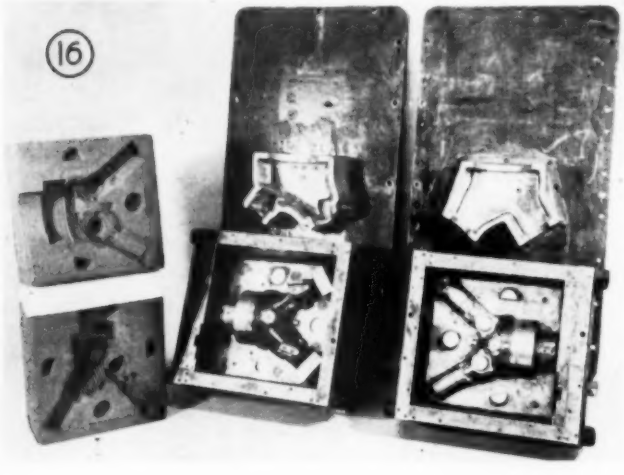
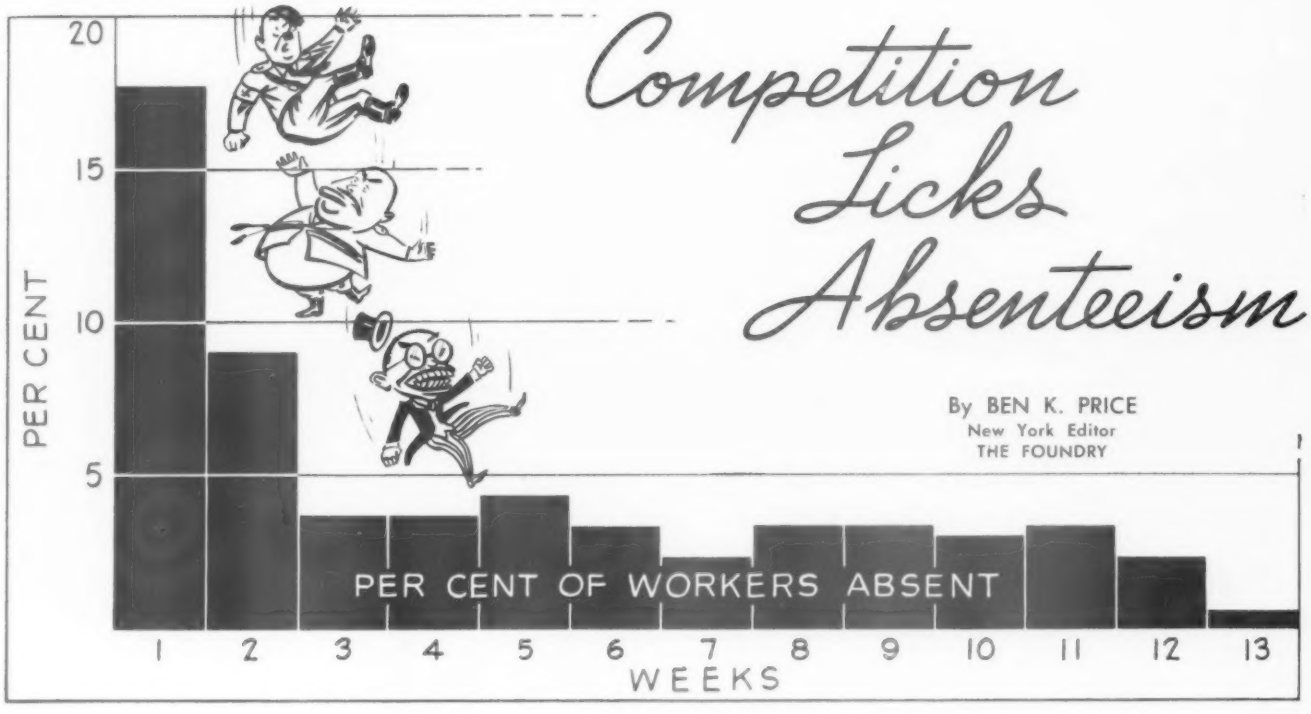


Fig. 16—Aluminum aircraft cylinder head cores made by blowing, showing boxes and plates

Competition Licks Absenteeism

By BEN K. PRICE
New York Editor
THE FOUNDRY



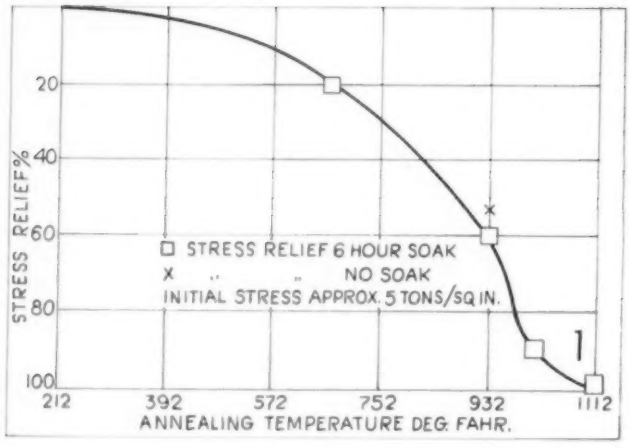
Percentage of absenteeism at Portsmouth, Va., plant of American Brake Shoe Co. during first 15 weeks after introduction of the Stay-on-the-Job Plan

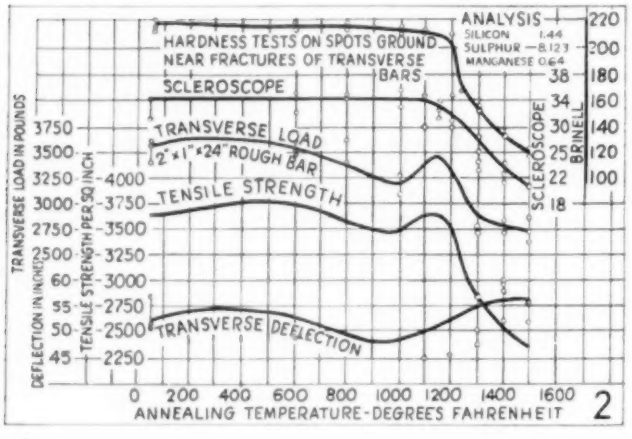
A DIFFERENT approach than usual to the absentee problem—one that looks good—has been developed at the Portsmouth, Va., plant of the American Brake Shoe Co. It plays up the fellows who stay on the job rather than emphasizing the shortcomings of those who do not. To date results have proved gratifying to the management, and particularly since they have been achieved in an area in which absenteeism has been especially rampant. Employers around Portsmouth and in nearby Norfolk, the site of the large Norfolk navy yard, have had considerable trouble keeping men on the job.

Brake Shoe operates 58 plants from coast to coast, and the experiment at the Portsmouth plant has been followed closely and with much interest by the other 57. It is often better to work out an idea of this nature in one plant where the superintendent can observe its operation and get first-hand reactions. The psychology of the plan appears sound and should have broad application. Certainly the graph on this page speaks well for what has been accomplished in the 13 weeks that this plan has been in operation. Man-days actually lost from all causes dropped in the ratio of 5 to 1, and as the percentage curve shows, there has been a decline in absence from 17.7 per cent to less than 1 per cent during this 13-week period.

Production has improved substantially, although not in the same ratio that absen- (*Please turn to page* 176)

(Left below)—Team captains and co-captains at the Portsmouth plant. (Right)—Winning team of the month—"The Red Hot Melters"—assembled for its beer and oyster supper. Waiters were selected from losing teams. The supervisory force attended the dinner ex officio but had to qualify by a perfect attendance record





Progress in

By J. S. VANICK
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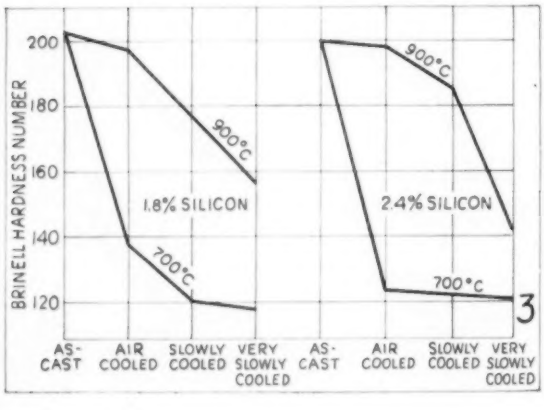
International Nickel Co.
New York

HEAT treatment of cast iron is a vast, uncultivated field, held in reserve for future expansion in the fields in which cast iron serves. The reason for its dilatory progress is due to several important physical and economical factors which must be solved before it can proceed.

At present, heat treatment, to enhance tensile strength or toughness, is limited mainly to test bar work, which reveals that simple quenching and tempering treatments may increase tensile strength 15,000 to 25,000 pounds above "as cast" levels. A greater commercial interest exists in hardening production castings, and if a high hardness happens to be the desired property, then brinell hardness values of 200 to 500 may be obtained in castings with uniformly good wearing structures. These improvements register most emphatically in the better grades of iron, but heat treatment by quenching and tem-

This is the first of two articles comprising a paper presented at the Sixth Annual Foundry Conference held by the Wisconsin Chapter of the A.F.A. at Milwaukee on Feb. 18 and 19.



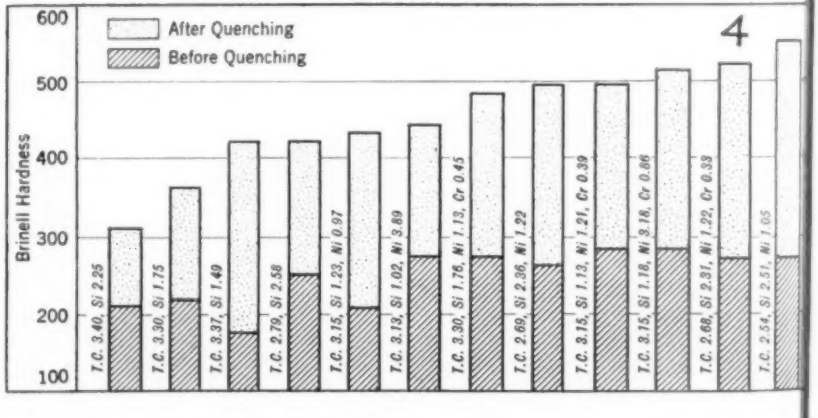

After Quenching
Before Quenching
Brinell Hardness
T.C. 3.40, Si 2.25
T.C. 3.30, Si 1.75
T.C. 3.37, Si 1.49
T.C. 2.79, Si 2.58
T.C. 3.15, Si 1.23, Ni 0.97
T.C. 3.13, Si 1.02, Ni 3.89
T.C. 3.30, Si 1.78, Ni 1.13, Cr 0.45
T.C. 2.69, Si 2.36, Ni 1.22
T.C. 3.15, Si 1.13, Ni 1.21, Cr 0.39
T.C. 3.15, Si 1.18, Ni 3.18, Cr 0.86
T.C. 2.68, Si 2.31, Ni 1.22, Cr 0.33
T.C. 2.54, Si 2.51, Ni 1.05
4

Table I—Stress Relief of Cast Iron on Annealing

Specimen	Treatment: Holding Time Hrs.	Treatment: Temp. °F.	Thickness In.	Effective Length In.	Deflection: Initial	Deflection: Final	Stress 1000 lb. per sq. in.: Initial	Stress 1000 lb. per sq. in.: Residual	Stress Relief 1000 lb. per sq. in.	Stress Relief Per cent
A	6 Hrs.	660	0.489	11.5	0.039	0.008	11.9	9.4	2.5	20.6
A₁°	6 Hrs.	930	0.489	11.5	0.031	0.018	9.4	3.8	5.6	60.0
B	6 Hrs.	1,020	0.511	11.25	0.036	0.032	11.9	1.1	10.8	90.0
C	6 Hrs.	1,110	0.511	11.5	0.039	0.038	12.4	.31	12.4	97.5
D°°		930	0.511	11.5	0.039	0.020	12.4	6.0	6.4	51.5
E°°		1,110	0.511	11.5	0.039	0.031	12.4	2.6	9.9	80.0

° "A" Reheated °° No Soaking

Heat Treatment OF ALLOY CAST IRON

pering is not an exclusive property of some cast irons. Almost any good cast iron will respond effectively, and with proper treatment, perhaps requiring extra care in heating and handling, the poorer grades of cast iron can be made to respond well.

Obstructions to the extensive application of heat treatment rest in: (1) Need to exclude all but simple, symmetrical shapes. (2) Machinability. (3) Distortion. (4) Prohibitive cost (except for large volume of parts to absorb cost). (5) Ability to make high strength parts "as cast," thus avoiding difficulty with distortion or lack of machinability.

Since heat treating adds an appreciable increment of cost to the casting, it is desirable to avoid the hazards of an indifferent response that may occur in the poorer grades of cast iron, and limit heat treatment to those irons whose composition and care in production warrant the added cost and attention that heat treatment requires.

It is important for the heat treater to know and control by close specifications the actual composition of the material he is handling in order to obtain the best results from his heat treating practice. For example, plain cast irons usually can be processed more rapidly through a "softening anneal" than alloyed cast irons. On the other hand, alloyed cast irons may be exposed to somewhat higher temperatures during stress-relief annealing with much less risk of damage to mechanical properties. In the quenching treatments, it is important to heat above the critical range sufficiently high to dissolve all constituents essential to the hardening treatment.

Some elements lower the critical range. Others, like silicon, raise it. A heat treatment suitable for a low silicon composition may fail if castings made to the same strength or similar physical property specifications happen to be made in a high silicon product, as illustrated in Table IV. Certain factors such as distortion are usually greater the higher the quenching temperature, and the use of an excessively high quenching temperature to overcome some of the previously mentioned obstructions may lead into distortion difficulties. Therefore, any production size heat treating program must be built upon a specification that defines the composition as well as important physical properties if consistently uniform results are expected by heat treatment.

It is a popular belief that heat treatment is applied only to strengthen or harden a casting. A review of the many definitions of heat treatment compiled by the Joint Committee of the A.S.M., A.F.A., A.S.T.M. and S.A.E., *American Foundryman* January, 1943, will reveal the many important objectives for which metals are heat treated. The applications reveal the depth and detail of the existing knowledge of heat treating. It is less commonly known that it is possible to "surface harden" a soft iron,

Fig. 1—Effect of annealing temperature on stress relief and growth of cast iron containing 1.4 per cent silicon, 0.70 per cent manganese, 0.100 per cent sulphur, and 0.50 per cent phosphorus. Tensile strength 31,000 pounds per square inch, brinell hardness 217. Fig. 2—Results obtained on cast irons annealed at various temperatures according to MacPherran and Harper. Fig. 3—Effect of rate of cooling on brinnell hardness according to A. A. Timmins. Bars 1.2 inches in diameter. Slowly cooled bar was at rate of 6 degrees Fahr. per minute. Very slowly cooled bar was at rate of 2 degrees Fahr. per minute. Fig. 4—Hardness of plain and alloy cast iron, 1¼-inch diameter arbitration bars before (lower division) and after quenching in oil from 50 degrees Fahr. above the critical range

Table II—Low Temperature Anneal of High Test Irons

Heat No.	—Analysis, Per Cent— Ni	Mo	TC	CC	Si	As Cast: Transverse* Load, lb.	Deflection, in.	BHN	Tensile Strength, lb. per sq. in.	Drawn Five Hours at 600°F.: BHN	Tensile Strength, lb. per sq. in.	Drawn Five Hours at 700°F.: BHN	Tensile Strength, lb. per sq. in.
11,691	1.09	0.33	2.26	0.72	2.27	4,050	0.26	286	71,000	286	72,200	...	...
11,694	1.04	0.81	2.31	0.76	2.30	4,600	0.32	321	80,600	321	95,000	...	...
11,695	1.03	1.36	2.30	0.75	2.31	4,700	0.33	321	71,800	340	98,000	364	97,200
11,697	2.06	0.82	2.28	0.74	2.31	4,600	0.36	340	74,400	364	97,600	321	89,200
11,698	2.03	1.31	2.30	0.77	2.32	4,800	0.35	387	82,000	382	98,000†	387	89,200
11,699	3.00	0.31	2.33	0.73	2.36	3,850	0.30	375	...	375	88,000†	...	...
11,700	3.05	0.81	2.25	0.60	2.35	3,800	0.30	418	...	387	98,200	395	105,200
11,701	4.05	0.30	2.29	0.70	2.30	3,000	0.25	444	...	412	92,200†	...	...

* 18-inch Span † 15-hour Draw

Table III—Variation in Density of Two Irons

No.	T.C.	Si	Mn	BHN	Heat Treatment	Density
A	3.35	1.58	0.87	340	A	7.27
B	3.37	1.49	0.58	440	B	7.39

A—Oil quenched from 1600 degrees Fahr.; 3 x 6 x 6-inch block.
B—Oil quenched from 1550 degrees Fahr.; 3-inch section.

and what is more astonishing, to "surface soften" a hard iron.

Sometimes a gas may be locked in a casting and an annealing or baking is needed to eliminate the stress raised by it. A casting may be heat treated solely for the purpose of stabilizing its dimensions against the algebraic sum of the stresses residing within it which were caused by the irregular rates at which different portions of the casting cooled. This, and some of the other important processes, will be described in the following.

Stress relief annealing is defined as "the process of reducing internal residual stresses in a casting by heating it to a temperature (usually below the transformation range) and holding for a proper time at that temperature. Slow cooling is implied. The practice of "aging" to achieve dimensional stability still is employed, and consists of storing castings for weeks or even months before machining. It has been found that stresses could be relieved quickly and with greater certainty by heating the casting to carefully controlled temperatures and then slowly cooling.

Using test bars subjected to a fixed deformation which were measured before and after heating, Benson and Allison[1] found that 50 to 60 per cent of the stress was relieved at 930 degrees Fahr.; 90 per cent at 1020 degrees Fahr., and 98 per cent at 1110 degrees Fahr. (See Fig. 1 and Table I).

Stresses are removed more quickly and completely the higher the temperature or the longer the time of heating, but unless the metal is heated high enough to lower its elastic properties practically to zero, complete stress relief cannot take place; the elastic return of the metal will again restore some of the internal stresses. The amount of plastic deformation which is required to permit stress relief is very small, being of the order of 0.001-inch per inch.

Present practice for the relief of internal stresses in castings is to heat to from 800 to 1050 degrees Fahr. (although in some cases, such as chilled car wheels and alloyed cast irons, higher temperatures are used), holding at temperature one hour per inch of section, followed by cooling slowly in the furnace. Alloyed irons generally may be heated to higher temperatures (approaching 1200 degrees Fahr.), and held for shorter periods of time. The importance of preserving desirable properties of cast iron, and avoiding too high a temperature in stress relief annealing is shown in Fig. 2.

Annealing has been described as a process involving heating and cooling applied usually to induce softening. The term is also used to cover treatments intended to: (a) Remove stresses. (b) Alter mechanical or physical properties. (c) Produce a definite microstructure. (d) Remove gases.

Other specific heat treatments of iron-base alloys covered by the term annealing and applicable to gray iron castings are: (e) Full Annealing. (f) Graphitizing. (g) Malleabilizing.

Items (a) and (d) are treatments similar to stress relief annealing, and their processing has been described above. Items (f) and (g) relate to the special handling of chilled or white irons which contain hard, massive cementite that must be broken down to toughen them or make them machinable.

May Require High Temperatures

Castings which are hard and unmachinable due to the presence of "chill" may require heating to as high as 1700 to 1800 degrees Fahr., whereas gray irons free of "chill" may be annealed at considerably lower temperatures. Assuming that carbide stabilizing elements such as chromium, sulphur, molybdenum, vanadium, etc. are not present in excess, then heating at 1700 to 1800 degrees Fahr. for 1 to 3 hours per inch of section, will "break down the chill" (or Ledeburite—cementite) and restore machinability.

The cooling rate may be timed to (a) retain normal strength and hardness, and (b) obtain a soft, weakened iron. The (a) type of cooling rate would require air cooling from the high temperature (1700 to 1800 degrees Fahr.), to 1000 degrees Fahr., followed by slow cooling in the furnace from this temperature, to secure the benefits of a "stress relief anneal" described above. The (b) cooling rate would consist of a slow cooling in the furnace from the high annealing (1700 to 1800 degrees Fahr.) temperature. These heat treatments are used mainly as reclamation measures upon castings whose composition is out of balance in terms of "susceptibility to chill." They rarely are needed in regular foundry practice.

Short annealed (malleabilized) white cast irons often alloyed with extra silicon or with nickel, molybdenum, chromium, are being regularly produced. They require reverberatory or electric-furnace (*Please turn to page* 178)

Table IV—Increase in Alloy Content Raises Quenching Temperature

	TC	Si	Mn	Ni	Cr	Mo	3" Sections—BHN As cast	3" Sections—BHN Heat treated	
Orig. Spec.	3.13	1.02	.79	3.89	..	...		480	A
Revised Spec.	2.83	2.43	.64	2.41	1.05	0.81	270	255	B
Revised Spec.	2.83	..	.64	2.41	1.05	0.81	270	564	C

A—Oil quenched from 1450° F.—No draw.
B—Oil quenched from 1400° F.—Drawn at 375° F. for 3 hours.
C—Oil quenched from 1500° F.—Drawn at 375° F. for 3 hours.

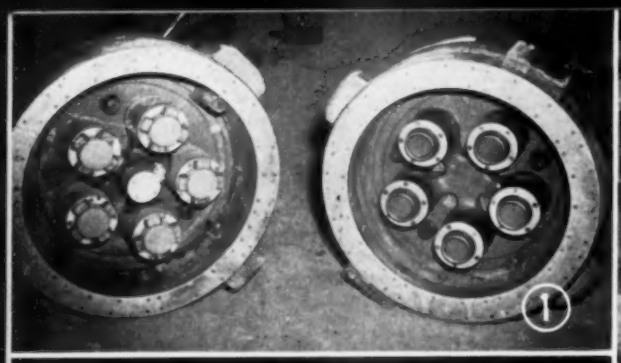
United States Has 4802 Foundries

A TOTAL of 4802 foundries is in operation in the United States, according to statistics compiled from the 1943-44 edition of *Penton's Foundry List* recently published by the Penton Publishing Co., Cleveland. This represents a net loss of 10 foundries since the previous edition was published in 1941. During this same period, the number of foundries in Canada increased by 46, bringing the total number of plants in the Dominion to 493, and the grand total for the United States and Canada to 5295. A complete tabulation of information prepared from the new Penton's List is shown in the accompanying table.

While the number of gray iron foundries decreased from 3006 in 1941 to 2890 at the present time, the shrinkage has been confined almost entirely to smaller plants. During the past two years the demands of the war program have resulted in the construction of a number of sizeable gray iron foundries, in num- (*Please turn to page* 131)

FOUNDRY DISTRIBUTION—UNITED STATES, CANADA

	Total Foundries 1943	Total Foundries 1941	Increase or Decrease in two years	Gray Iron Foundries 1943	Gray Iron Foundries 1941	Steel Foundries 1943	Steel Foundries 1941	Electric Steel Foundries 1943	Electric Steel Foundries 1941	Malleable Foundries 1943	Malleable Foundries 1941	Exclusive Nonferrous Foundries 1943	Exclusive Nonferrous Foundries 1941	Nonferrous Foundries Dept. of Other Shops 1943	Nonferrous Foundries Dept. of Other Shops 1941	Total Nonferrous Foundries 1943	Total Nonferrous Foundries 1941	Aluminum Foundries 1943	Aluminum Foundries 1941	Magnesium Foundries 1943	Permanent Mold 1943	Machine Shop 1943	Pattern Shop 1943	Laboratories 1943
Alabama	90	89	+ 1	80	80	6	4	4	2	3	2	7	7	14	22	21	29	12	17	..	2	64	65	18
Arizona	7	6	+ 1	7	6	3	2	3	2	..	..	..	..	4	5	4	5	1	3	1	2	4	7	1
Arkansas	18	21	— 3	15	18	1	1	1	1	..	..	2	2	5	10	7	12	2	7	..	..	13	9	1
California	331	302	+ 29	136	137	30	21	29	19	2	3	126	135	60	69	186	199	166	165	19	25	137	157	66
Colorado	39	45	— 6	20	27	4	3	2	2	1	1	14	13	4	8	18	21	14	20	1	5	20	16	11
Connecticut	126	122	+ 4	56	59	5	6	5	5	8	7	61	57	26	29	87	86	56	70	4	7	71	71	35
Delaware	11	11	..	6	5	3	2	2	1	1	1	3	3	4	4	7	7	4	4	1	..	8	8	3
Dist. of Columbia	2	1	+ 1	2	1	1	1	1	1	..	..	..	..	2	1	2	1	2	1	..	..	1	2	1
Florida	33	29	+ 4	24	25	1	1	1	1	..	1	10	4	18	23	28	27	18	24	1	1	22	23	3
Georgia	70	65	+ 5	61	56	3	2	2	1	..	..	7	7	27	35	34	42	24	33	..	3	48	51	3
Idaho	6	7	— 1	5	6	1	..	1	..	..	..	..	..	5	6	5	6	2	4	..	..	6	5	1
Illinois	373	385	—12	204	217	25	23	15	13	18	19	128	136	57	73	185	209	137	170	13	22	211	231	104
Indiana	210	199	+11	126	131	12	9	9	7	10	10	63	55	43	49	106	104	74	79	3	9	113	117	55
Iowa	80	80	..	59	57	5	4	4	2	2	2	13	13	24	30	37	43	33	36	..	2	51	56	27
Kansas	49	49	..	41	42	1	1	1	1	..	..	8	7	17	30	25	37	22	30	1	2	36	35	9
Kentucky	36	36	..	24	25	..	..	..	..	..	..	12	10	7	10	19	20	11	13	..	2	25	23	3
Louisiana	33	30	+ 3	24	25	5	5	4	4	..	..	7	4	18	18	25	22	15	15	1	2	21	21	6
Maine	24	25	— 1	22	23	..	..	..	..	..	..	2	2	13	16	15	18	10	12	..	..	15	15	2
Maryland	44	48	— 4	31	34	..	..	..	..	1	1	12	13	13	15	25	28	15	19	1	..	28	25	12
Massachusetts	207	211	— 4	114	117	8	9	7	8	3	5	89	85	44	45	133	130	89	101	5	7	92	103	42
Michigan	336	318	+18	176	180	23	21	22	15	10	11	131	108	62	70	193	178	137	123	18	23	177	176	106
Minnesota	100	98	+ 2	73	71	3	4	2	3	1	1	23	22	22	30	45	52	36	41	2	11	62	56	22
Mississippi	13	14	— 1	12	13	1	..	1	..	..	..	..	1	10	9	10	10	2	5	..	1	12	8	2
Missouri	104	116	—12	59	68	12	9	10	7	1	2	39	36	11	19	50	55	39	45	2	8	57	66	36
Montana	8	9	— 1	8	9	..	..	..	..	..	..	..	..	6	9	6	9	1	4	..	1	8	7	1
Nebraska	19	21	— 2	14	16	1	1	1	1	..	..	4	4	9	11	13	15	12	13	..	2	15	14	2
Nevada	3	3	..	3	3	..	1	..	1	..	1	..	..	3	3	3	3	..	..	..	..	1	3	1
New Hampshire	23	24	— 1	15	16	2	2	2	1	1	1	7	7	9	10	16	17	12	13	..	..	12	13	2
New Jersey	172	176	— 4	81	85	7	6	6	5	2	4	80	83	24	31	104	114	75	96	4	6	90	80	41
New Mexico	1	1	..	1	1	..	..	..	..	..	..	..	..	1	1	1	1	..	1	..	..	1	1	..
New York	398	382	+16	203	216	22	15	18	12	14	15	167	142	82	101	249	243	183	187	15	26	229	231	103
North Carolina	65	63	+ 2	60	60	..	..	..	..	..	..	5	2	29	42	34	44	31	35	..	4	43	45	..
North Dakota	4	5	— 1	3	4	..	..	..	..	..	..	2	1	1	3	3	4	3	2	..	..	4	4	..
Ohio	303	307	— 4	279	289	34	34	29	26	17	21	187	177	79	82	266	259	203	212	20	27	286	284	164
Oklahoma	40	36	+ 4	28	25	1	1	1	1	..	..	8	10	13	15	21	25	20	22	1	3	28	28	4
Oregon	50	55	— 5	35	40	6	5	5	3	..	..	8	9	16	22	24	31	15	23	..	..	23	25	10
Pennsylvania	519	557	—38	328	350	61	58	34	33	16	17	138	137	120	155	258	292	168	209	4	25	339	343	139
Rhode Island	38	36	+ 2	18	16	..	1	..	..	2	3	9	19	5	6	14	25	19	23	..	1	16	17	10
South Carolina	21	19	+ 2	20	19	..	..	..	..	..	..	1	..	15	15	16	15	10	13	..	1	16	16	2
South Dakota	3	3	..	3	3	..	..	..	..	..	..	..	..	2	2	2	2	2	2	..	..	3	3	1
Tennessee	72	73	— 1	63	60	1	3	1	2	..	..	7	8	23	29	30	37	19	23	1	1	52	54	16
Texas	108	104	+ 4	69	70	10	9	9	8	..	1	26	28	34	40	60	68	51	56	..	5	61	64	22
Utah	18	18	..	14	15	1	1	1	1	..	..	4	3	6	9	10	12	7	10	..	..	7	10	5
Vermont	16	16	..	14	14	..	..	..	..	..	..	2	2	3	8	5	10	4	6	..	..	12	11	1
Virginia	68	71	— 3	64	68	2	3	1	2	..	..	3	3	39	42	42	45	30	36	..	3	47	43	10
Washington	85	90	— 5	49	58	18	14	17	12	1	1	24	23	29	33	53	56	39	44	1	5	34	38	17
West Virginia	38	39	— 1	26	28	2	2	1	1	1	1	9	9	15	19	24	28	14	21	..	3	27	26	8
Wisconsin	186	196	—10	114	117	13	14	14	13	11	10	57	64	41	39	98	103	71	85	..	11	105	100	63
Wyoming	2	1	+ 1	1	1	..	..	..	..	..	..	1	..	..	1	1	1	1	1	..	..	1	1	1
Total	4802	4812	—10	2890	3006	334	298	266	217	126	141	1506	1446	1114	1354	2620	2800	1911	2174	129	258	2754	2807	1192
Alberta	12	14	— 2	10	11	1	1	1	1	..	..	1	2	9	10	10	12	8	12	..	1	10	11	1
British Columbia	55	48	+ 7	41	35	8	5	7	5	1	1	13	9	26	27	39	36	30	30	3	4	28	32	8
Manitoba	17	14	+ 3	10	8	2	2	2	2	..	..	5	5	3	3	8	8	8	8	1	2	10	13	6
New Brunswick	9	11	— 2	8	10	..	..	..	..	..	..	1	1	5	7	6	8	3	5	..	1	7	7	2
Newfoundland	5	3	+ 2	4	3	1	1	1	1	..	..	..	..	4	3	4	3	3	3	..	..	2	4	1
Nova Scotia	23	21	+ 2	21	19	2	2	2	1	1	1	1	1	15	15	16	16	10	10	1	1	15	16	4
Ontario	255	244	+11	174	179	9	8	7	4	11	11	58	50	76	94	134	144	117	120	5	11	174	159	51
Prince Edward Island	4	2	+ 2	3	2	..	..	..	..	..	..	..	..	2	1	2	1	1	1	..	..	3	2	..
Quebec	106	85	+21	66	59	11	9	8	8	2	1	20	18	36	43	56	61	53	57	2	9	69	63	28
Saskatchewan	7	5	+ 2	6	5	..	..	..	..	..	..	..	..	3	5	3	5	3	4	..	..	5	5	..
Total	493	447	+46	343	331	34	28	28	22	15	14	99	86	179	208	278	294	236	250	12	29	323	312	105
Total in U. S. and Canada	5295	5259	+36	3233	3337	368	326	294	239	141	155	1605	1532	1293	1562	2898	3094	2147	2424	141	287	3077	3119	1297



Pours Steel in Cores SPUN

CASTINGS produced on centrifugal machines at Wehr Steel Co., Milwaukee, are made in cores. Centrifugal machines are all vertical with varipitch pullies, texrope drum, and single speed motor. Each unit has an individual motor and starter. The starting controls all are placed on the column in the safety zone with telltale lights.

Fig. 1 shows pattern for cluster type molds where patterns are clustered around a central sprue, and Fig. 2 shows the making of the core which is well-rodded or arbored to decrease any possibility of breakout of metal. A cluster type mold in which the castings revolve around a central sprue is depicted in Fig. 3. Each casting is poured and fed from this sprue.

Core assembly of the cluster type and cores are matched by three bosses and recesses to prevent shift as indicated in Fig. 3A. Cores are pasted in a sealing ring provided for this purpose. The seal ring is an extra precaution for securing the core to eliminate the spilling of metal. A complete assembly is shown in Fig. 6.

Cores for center feed type casting where casting revolves around its own axis are shown in Fig. 4. Casting is poured and fed through sprue provided in center of core. This type of casting is limited depending on the

A paper presented at the annual meeting of the Steel Founders' Society of America held at Chicago, Feb. 10-11

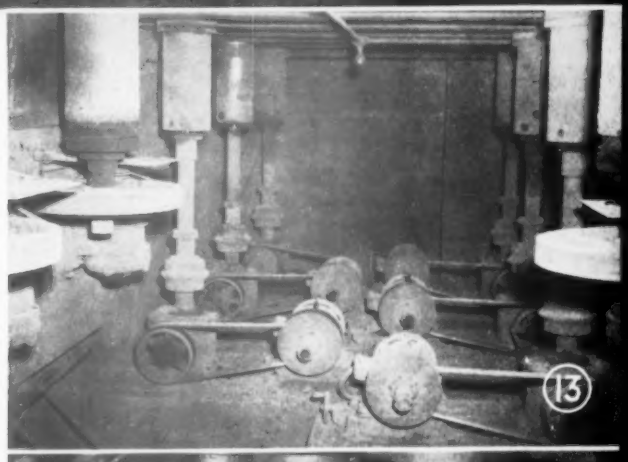
By A. T. BAUMER
Wehr Steel Co.
Milwaukee

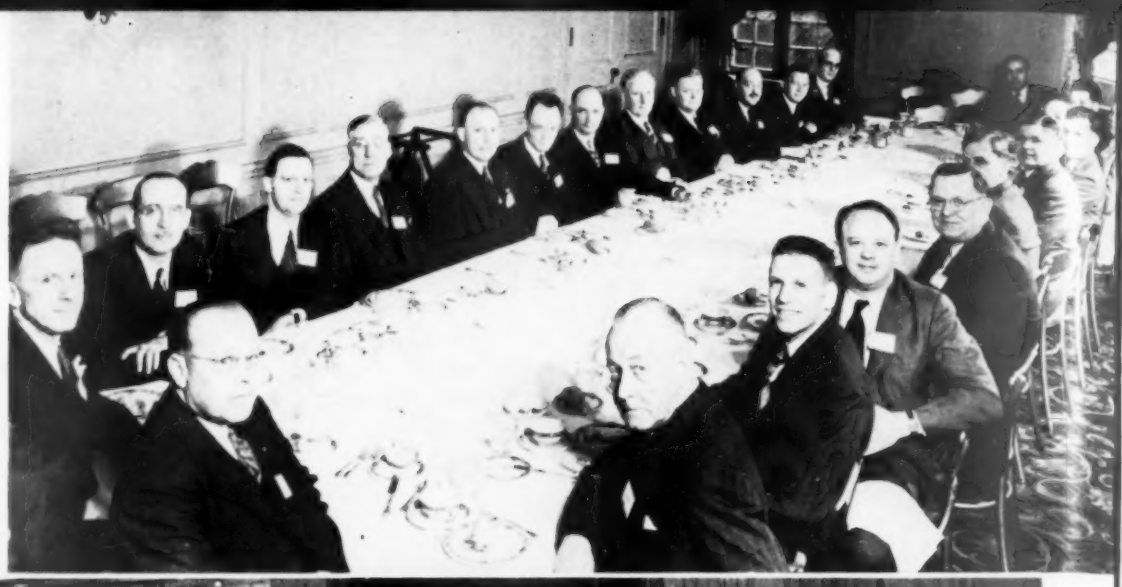
NVERTICALLY

size of the center core. Figs. 4A, 4B and 4C depict respectively the first, second and third steps of assembling center fed type casting. The latter also shows the top section being cast in a permanent die. This die serves as a permanent core and also as a chill in eliminating extra feed for heavy sections on the top which would be necessary if a chill were not employed. Fig. 4D shows complete assembly of the same center fed type core.

Placing of the jacket on the plate is illustrated in Fig. 5. The plate is slipped on to a vertical shaft which is driven as previously explained. This plate has a tapered male dowel arrangement which seats the tub on the plate. Placing the core in the jacket is indicated in Fig. 6. The core fits loosely to within 1 inch to 1½ inch of the bottom where it is engaged by a stepdown or an offset in the diameter in order to firmly secure the core against side motion.

Fig. 8 shows the clamping and placing of runner core. The cover, with a flange hole to accept the runner core, is clamped into the assembly. The runner core is wedged into the hole and all cores are completely clamped with wedges to the bottom of the plate in order to prevent the raising of the cope on the pouring pressure. The spinner set up ready for pouring is illustrated in Fig. 15. This also shows the safety apron which is adjustable for any height of mold. Front view of pouring is shown in Fig. 7. All pouring is done (*Please turn to page* 177)





(Right) — Luncheon meeting of the Cupola Research committee, under direction of R. G. McElwee, chairman, was one of several held by various divisions and committees of the association during the congress

Large attendance marked the three-meeting symposium on gray cast iron as an engineering material

Col. Merle H. Davis, St. Louis Ordnance District chief, and C. B. Shanley, St. Louis chapter chairman, at opening session. (Right)—View of annual A.F.A. dinner

A·F·A War Congress

EACH year the acceleration in foundry progress increases the number of subjects to be given consideration at the technical sessions held annually during the convention of the American Foundrymen's Association. The past year, with the pressing need for meeting the tremendous demands for war production, proved no exception to this trend. As a result, the program for the War Production Foundry Congress, held in St. Louis, April 28 to 30, was one of the most extensive in recent years. By utilizing all available time and by holding a number of sessions each evening, it was possible to crowd the activities of a normal 5-day convention into 3 days. Due to the extensive character of the program, THE FOUNDRY was able to present complete reports of only a part of the technical sessions in the June, Pre-Convention issue, and therefore the remaining reports are presented on the following pages.

The job evaluation and time study session held Wednesday afternoon was under the chairmanship of Frank E. Wartgow, American Steel Foundries, East Chicago, Ind., with W. E. George, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich., as co-chairman. Mr. Wartgow and Mr. George, together with E. P. Berg, Link-Belt Co., Chicago, and S. A. Peck, Trundle Engineering Co., Cleveland, served as leaders for the panel discussion of "Time Study and Job Evaluation as Applied to the Foundry."

Mr. Peck presented a paper on job evaluation, in which he outlined the steps to be taken in setting up a program. He discussed the point system, whereby jobs are evaluated on a basis of 1000 points. Mr. Peck recommended the organization of a committee comprised of representatives of management and labor, with a consultant, who is an outside, disinterested party, to serve as secretary of the group. The next step is to prepare descriptions of the jobs to be evaluated. (*Please turn to page* 115)

Suggests Methods To Salvage Castings Which Are Porous

Q.—Occasionally we find some porous castings, and we would like to know if there is some procedure whereby these might be salvaged.

A.—Several procedures are available for the purpose you have in mind, that of salvaging castings which sweat or weep under pressure test. One involves the use of sodium silicate, or water glass, which preferably is injected into the casting under pressure so that it enters the porous section. After the casting is allowed to drain it may be subjected to an acid dip or immersion in calcium chloride to precipitate insoluble silica. Following such treatment the casting is placed in an oven and baked.

Another method is to use synthetic resin solutions which are forced into the interstices under pressures as high as 250 to 500 pounds from 2 to 30 minutes to insure adequate penetration. In some cases the castings may be placed in a vacuum chamber, the air evacuated, the resin solution admitted, and then pressure applied. After draining, excess material is washed from the surface with alcohol, and the casting allowed to dry. Then it is baked at 175 degrees Fahr. for about an hour to remove the resin solvent, and the temperature gradually raised to 250 to 275 degrees Fahr. to polymerize the resin which takes from 2 to 5 hours.

Similarly chinawood or tung oil is used for sealing castings. The oil at a temperature of about 210 degrees Fahr. is admitted to the evacuated chamber and then subjected to an air pressure of 75 to 100 pounds per square inch for about 10 minutes. Castings are removed, rinsed in kerosene and placed in an oil bath maintained at 475 to 500 degrees for 30 to 45 minutes. They are removed from the bath, washed in kerosene, and then are ready for test.

Facing Sand Is Not Necessary On Medium Brass Casting

Q.—What are the ingredients of a good facing sand for 50-pound brass castings to be dried with a gas torch? The alloy is 88-6-4½-1½ metal.

A.—Since you do not state why you require a facing sand mixture, we assume that because of complicated design or concentration of a 50-pound casting plus riser weight on a constricted area the metal tends to burn into the surface, and you expect to overcome the trouble by use of facing, and drying. A 50-pound casting of normal design hardly would require the use of dry sand or skin dried molds. The probability is that your sand is rather close and does not vent freely so that trouble is encountered with scabbing. Possibly you are pouring the metal rather hot for the mass of the casting, resulting in the tendency for a low melting constituent to burn into the surface and produce a rough section on the casting.

A number of facings are commonly used for red bronzes, and, of course, every foundryman has his own particular pet combination of sand and binders which he feels is the last word. However, it is best to use the minimum amount of binder; in fact, it is best to use a limited amount of facing unless a great deal of care is taken to insure an open condition in the sand that backs up the facing. Any facing necessarily is close and, therefore, does not vent freely. Any binder that will hold the sand together after being dried with a torch will contain something that burns when exposed to hot metal, producing gases. That must be eliminated through venting of the mold if blows in the castings are to be avoided. The safest way to make a skin dried mold is to spray the surface of a well prepared mold with some binder such as molasses water or dextrose dissolved in water, and allow the solution to penetrate just deep enough to provide surface binding after drying with a torch. Back of that surface the sand must be open.

We hesitate to give specific ingredients of a facing sand because details are lacking on the application, and the condition you now experience might get worse instead of better. All we can do is offer general instructions from which you can determine proportions of molding sand and other materials to overcome your trouble. Such materials include sharp sand, zirconium flour, etc., with binders such as fire-clay, bentonite, flour, linseed oil and the like.

Gives Method for Normalizing Gray Iron Castings

Q.—We have an order for some gray iron castings weighing from 2 to 30 pounds each which must be normalized in an annealing oven. In lieu of having the work done elsewhere due to transportation involved, etc., we are considering a unit at our plant, but are unfamiliar with the process, the equipment and cost. Could you give us any information on those points?

A.—While we are not sure, we believe that your use of the term normalizing refers to what more commonly is called stress-relief annealing, which is defined as the process of reducing internal stresses in a casting by heating it to a

temperature below the transformation range and holding it for a proper time at that temperature. It sometimes is referred to as "aging," and the procedure is to heat the casting to a temperature ranging from 800 to 1050 degrees Fahr., and hold at the temperature about 1 hour per inch of the heaviest section. Then cool slowly in the furnace. That practice changes the physical properties but slightly.

If by normalizing you mean heat treatment to secure easily machinable castings, a considerably higher temperature range is employed in the region of 1500 to 1600 degrees Fahr. That causes rapid softening and a decrease in physical properties.

Equipment required will include some type of heat treating furnace with temperature control, also handling equipment. Since a number of furnace types are available, it is suggested that you consult the advertising pages of THE FOUNDRY for names of manufacturers, and write to them for information. It might be well also to point out that to secure a furnace, the necessary priority rating must be obtained from the War Production Board. Capacity of the furnace needed will depend upon the amount of work to be handled, but in that connection it might be advisable to consider possible future application in heat treatment other than the present normalizing or stress-relief treatment.

Naturally, heat treatment will add an appreciable amount to the final cost of a casting since it involves additional labor of handling, cost of operating the furnace, supervisory expenses, amortization and depreciation charges on the furnace, etc. Those must be determined if the heat treating department is to stand on its own feet and pay its way.

Wants Information on Molding Of a Large Bronze Pump

Q.—We are contemplating casting a bronze pump (85-5-5-5) of approximately 1600 pounds, and were wondering if it would be possible for you to send us a general idea of the core and facing mixture required on a job of this size.

A.—You do not state the design of the pump but we assume it to be a centrifugal one. This would mean that the area of the mold will be ample to support the weight, consequently the pressure per unit of area during the time when the metal is liquid will not be excessive even though the casting does weigh 1600 pounds. Consequently, the need for special facing is hardly understandable. It would seem better practice to simply surface the pattern with well riddled molding sand that has been passed through a No. 8 riddle and then back that up with an open sand of high permeability. Where the depth of sand is excessive it is opened up by the use of large gravel or even pieces of coke or coal to give a relatively uniform thickness of sand over the pattern backed up by a good open foundation as previously described.

If you contemplate making the mold by drying it in an oven so as to use a thoroughly dried sand mold then, of course, you must use a sand mixture that will hold its form and hard surface after the drying process is completed. High permeability also is required, and the free venting of the backing sand is exceedingly necessary if damage to the mold is to be avoided during the drying process. If you have but one casting to make, probably the safest method is to use a dry sand mold with a facing made up of 90 parts heap molding sand to which has been added 10 parts new molding sand moistened just enough to make it workable; about 6 to 7 per cent moisture content is best.

This sand mixture should be well mixed and put through a No. 8 riddle two or three times. It should be sifted carefully over the pattern, and when the backing sand is rammed to place this will form a facing over the pattern. When the pattern has been withdrawn and the mold is being cleaned up preparatory to drying, it should be sprayed lightly with a mixture of one part molasses or dextrose and nine parts water. The surface then should be brushed with a good grade of mold blackening which is very high in graphite. Other refractory coatings also are available. Names of manufacturers of such materials may be obtained by consulting the advertising pages of THE FOUNDRY.

As to cores, a good grade of water-washed sharp sand or silica sand will give best results; for a binder a linseed oil base core oil which has been properly distributed throughout the sand mass will serve. When the cores are completed, they should be well coated with a graphite or silica blackening thoroughly rubbed into the surface and then the loose blackening carefully brushed off with a soft brush. In making all cores for such pumps, venting must be particularly well planned. All vents should be free, and every precaution should be taken to see that these vents are kept open and that they all join the main central vent leading to the exterior of the mold.

The cores should be baked thoroughly so that they are dried all the way through to eliminate any possible difficulty from blowing. Also after any application of liquid blackenings or coatings they should be placed in the oven a second time.

GANGWAY!

By Pvt. J. A. Patterson

"Now there gentlemen, goes the best built piece of machinery you've seen in many a day."

Floor Material for Small Foundry

Q.—We shall appreciate your opinion on the best type of floor for a new foundry. Our present cement floor seems to absorb the moisture from the sand.

A.—The best type of floor depends to some extent on local conditions, including the personal experience and preference of the man who has the deciding voice in the selection. For example you do not like cement floors and yet that is the material employed in many modern foundries. Hundreds of foundries operate on sand floors, a layer of molding sand spread over the natural earth on which the building is erected. Wood block floors present certain advantages and the same can be said for brick floors. Sand on any kind of built up floor dries more rapidly than it does on a sand floor, but that is only a minor factor, and can be prevented to a great extent by sprinkling the floor before the sand heap is cut over. Each material presents certain advantages and disadvantages, but cement, wood blocks or bricks make satisfactory floors.

Patterns for Sash Weight Castings

Q.—Some time ago we noted a reference in THE FOUNDRY to a method of making sash weight castings in which the patterns were removed horizontally through openings in the end of the flask. Can you supply more complete detail and if possible a sketch to illustrate the process?

A.—The castings are molded horizontally in several tiers superimposed on each other in a deep flask. This method has many commendable features. A large tonnage may be molded on a small floor space. The castings will show no longitudinal seams. Plain drag flasks only are required. The pattern equipment easily is prepared. The molding procedure is within the capacity of comparatively unskilled labor. The castings may be poured from a crane ladle and thus eliminate one of the most disagreeable features usually associated with the production of sash weight castings.

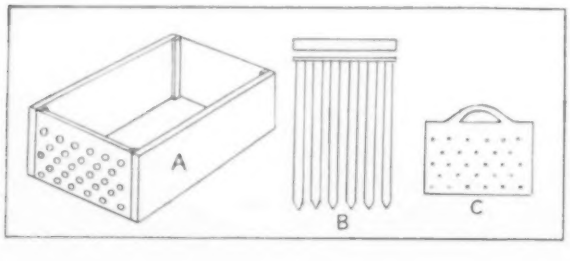
The number of flasks required will depend on the anticipated output, but the description of one will serve for all. The patterns may be adjusted to any desired length of castings within the capacity of the flask but to save sand and work, it is advisable to provide several flasks of assorted lengths.

Formerly the flasks were constructed with wood sides and cast iron ends. One end was a plain plate and the other end was pierced with rows of 2¼-inch openings arranged in such a manner that the openings in one row were staggered in relation to the openings above and below. This arrangement prevented the castings in one row from bursting into the molds immediately above. During the pouring process the bottom row of molds is filled first, then each row above is filled in succession. This arrangement also precludes the possibility of straining the lower castings. This style of flask is fairly satisfactory, but we think if we were equipping a foundry at the present time we should order a supply of steel flasks from the manufacturers of foundry equipment who specialize in this product. From the nature of the work it is apparent that the flasks are subjected to rather severe service.

The patterns are made from sections of 2-inch steel pipe, threaded at one end and closed and drawn to a fine point at the other end. The number of patterns is not arbitrary, but will depend on local conditions. Two sets will be required. In one the number of individual patterns will be less by one than in the other. This arrangement is necessary to maintain the staggered relation between the molds in one row and those in adjoining rows. Instead of attaching pipe patterns to the narrow flat steel plate as shown at B they may be used individually. The advantage of the bar construction is that time is saved in drawing the entire number with one movement. With everything in readiness the mold is made in the following manner.

The flask is placed approximately level on the foundry floor and the steel plate C which serves the double purpose of a runner and a locating device is erected at a point in the flask to correspond with the desired length of the castings. The first row of patterns is inserted through the lowest row of openings in the end of the flask and pushed forward until the sharp points locate themselves in the lowest row of openings in the plate C. Sand is rammed around the patterns and then the second row of patterns is inserted in like manner in the second row of openings in the end of the flask. After the sand is packed around the second row of patterns, the first row is withdrawn and reinserted through the third row of openings in the end of the flask. This procedure is repeated until all the openings have been utilized.

Sand on top of the flask is scraped off level, a plate is bedded down and weighted to resist the upward pressure of the metal. A basin is cut in the sand back of the plate C, after which the plate is drawn out of the sand and placed in another flask where the foregoing process is repeated. A cast iron plug in two parts or a small dry sand core is inserted in each of all openings in the end of the flask to form the eye of the sash-weight casting. The space around the end of the plug is daubed with mud to prevent a runout and the mold then is ready for the iron.



The perforated plate C serves for both runner and location plate at any desired position in the flask A. The patterns B may be attached to a bar as shown or handled as single units

Melt Cast Iron in Small Quantity

Q.—Can you give us any information in regard to an economical way to produce gray iron castings up to about 30 pounds in weight at the rate of 500 to 700 pounds per day?

A.—You can set up a small foundry plant and melt the iron in a cupola, an electric furnace or a rotary furnace fired with powdered coal but we do not think you can produce the castings as economically as you can purchase them from a local jobbing foundry. In addition to the actual cost for labor and material, you would have to absorb the capital expenditure on the plant and an out of proportion share of the overhead. An outside established foundry with a variety of jobs running at the same time is in position to turn out your 500 to 700 pounds with no capital cost to be absorbed and with little or no overhead to be charged against your order.

Assume that 500 pounds of castings cost you $25 and that the outside foundryman's profit was 10 per cent, or $2.50 per day. Even if you could produce the castings as cheaply as he can, an altogether unlikely supposition, you would not come out even under a period of several years. If other features, at present unknown to us, influence you to install a small foundry plant, you can find names and addresses of makers of all kind of equipment and supplies in the advertising pages of THE FOUNDRY.

Chills in the Mold Prevent Draws

Q.—We shall appreciate your opinion on the cause of fine cracks or draws on the interior of an aluminum alloy tire mold casting, 35 inches in diameter and 5⅝-inches deep. We have tried two methods of gating and risering this casting, but without eliminating the defect. The cleaned casting weighs 102 pounds and the metal is poured at a temperature of 1250 degrees Fahr.

A.—The immediate cause of the trouble is the difference in thickness between various sections of the casting. Irrespective of the type of gates and risers, the lighter sections will solidify before the

(*Concluded on page* 102)

NICKEL AIDS THE AUTOMOTIVE INDUSTRY

to KEEP 'EM ROLLING!

Using ingenuity and "know-how" born of long experience, automotive engineers designed the phenomenally successful transport equipment that now speeds the United Nations on the road to Victory.

Built to take punishment far above peacetime requirements, these specialized military vehicles are being produced in quantity by the mass-production methods that have amazed the world. From North Africa to the South Pacific, these trucks, jeeps, tanks and half-tracks have repeatedly met wartime demands for stepped-up performance.

This kind of engineering-thinking pioneered the application of Nickel alloyed materials. Now, when uninterrupted operation is so vitally important, the continued and widespread use of Nickel is clear evidence of its many advantages.

In steering knuckles or differentials, in forged gears or cast blocks, a little Nickel goes a long way to provide essential dependability. It improves strength/weight ratios, increases wear and corrosion resistance, imparts toughness, and assures uniform properties of the other metals with which it is combined.

Today, maintenance crews on far-off battle fronts are learning what metallurgists and engineers here long have known . . . that, properly used, Nickel aids to "keep 'em rolling."

For years the technical staffs of International Nickel have been privileged to cooperate with automotive engineers and production men . . . men whose work is now so necessary to the Nation. Counsel, and printed data about the selection, fabrication and heat treatment of ferrous and non-ferrous metals is available upon request.

★ Nickel ★

For lists of current publications, please address Technical Library Service

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York, N.Y.*

(*Concluded from page 100*)

heavy vertical section 1¾-inches in thickness. The proper remedy is to apply a chilling medium that will equalize the cooling speeds of the metal in all parts of the casting. A ring of spiral wire chills may be set up in the large mold cavity, or, a great number of small metal blocks may be incorporated in the—presumably—dry sand core which forms the two outside flanges on the casting. Similar chill blocks may be laid up against the pattern while the molder is ramming the sand on the inside.

Shape or size of the chills is not an important factor, but care must be taken to see that they are perfectly clean and dry. A single sprue in the center with four branch gates 90 degrees apart will distribute the metal uniformly and satisfactorily. With an adequate number of chills disposed properly, the number of risers may be reduced to one, or possibly two, 4 inches in diameter, 6 inches high at diametrically opposite points over the heavy ring part of the casting.

Brass Molds Faced With Pease Meal

Q.—A visitor in our office recently discussing the good old days in British nonferrous foundries, claimed that the only way to get a good smooth face on a brass or bronze casting is to face the mold with pease meal. Are you familiar with this practice?

A.—Pease meal was mentioned occasionally in the meager foundry literature available years ago. We have seen no reference to it in recent years. Possibly, but improbably, it still is used in out of the way places. Pease meal—note the archaic spelling—is fine powder made by grinding dried peas. You probably are aware that peas in dry storage become dehydrated and as hard as so much buck shot. Indeed it is claimed by some writers that in an emergency they have been used as ammunition. Pease meal was common and cheap when wheat flour was a luxury.

However, that is all beside the point. Some old foundry gaffer discovered that pease meal—probably dropped by accident—increased the green strength of his sand and that a light dusting of the same material on the face of the mold improved the surface appearance of brass and bronze castings. As a matter of fact any cereal will produce the same effect. It is common practice in American foundries to shake flour through a bag on the face of small molds for brass and bronze castings. The burning flour produces a slight gas film which prevents the metal from burning or penetrating the sand. The effect is practically the same as that produced by sea coal in molds for iron castings. The proper method of producing a clean skin on a brass casting is to use a suitable refractory sand, instead of trying to bolster up a weak sand with any kind of coating material. Molds for heavy nonferrous castings of course should be faced in the same manner as molds for ferrous metals poured at high temperatures.

Gives Information on Monel Castings

Q.—Some years ago we discontinued production of monel metal castings, but are expecting to go back into that field, and would like to obtain the latest information. Our previous practice was to melt in a crucible, pull the heat, and transfer into a second hot crucible containing a small amount of flux. Glass was used as a cover. We experienced trouble with spongy castings when all gates and old castings were used. Do heavy castings have a tendency to come spongy if poured hot? We have used blackened, dry-sand core molds with good results, but we understand that spongy or porous castings sometimes result from such practice.

A.—Careful attention to molding practice, proper melting equipment, and definite deoxidizing and desulphurizing methods are required for successful production of monel metal castings. High pouring temperatures of 2700 to 2850 degrees Fahr. necessitating the use of highly refractory sand, and the shrinkage and other solidification factors require the application of steel foundry practice rather than ordinary nonferrous practice. Risers and gates should be ample in size, and located so that adequate feeding of the casting is obtained.

Your previous practice of transferring the molten metal from one crucible to another is unnecessary since it leads to loss of heat. Desulphurization and degasification are carried out in the same crucible in which the metal is melted. Degasification or deoxidation is accomplished by the addition of 0.5 per cent manganese in the form of metallic manganese or 80 per cent ferromanganese, followed by the requisite quantity of metallic silicon about 5 minutes before pouring. After the additions the bath is stirred well with a wood pole. Amount of silicon to be added will depend on the size and section of the casting. Average silicon content for most applications is 1.50 per cent, but may run up to 2 per cent for heavy castings, and as low as 0.75 per cent in the case of castings with heavy and light sections closely adjoining. Monel metal blocks or ingots contain 0.80 per cent silicon.

Since monel metal and other high nickel alloys are quite sensitive to gases, the general practice is to hold the addition of remelt and scrap to as low a point as is consistent with foundry practice.

While pouring heavy castings too hot might have a tendency toward producing spongy castings, we believe that the difficulty you mention was the result of the type of mold used. Heavy monel metal castings should be made in thoroughly dried molds, and the same applies to medium weight castings. With skin dried molds, the moisture kicks back and causes agitation and disturbance of the slowly solidifying skin. There is no reason why cores cannot be used successfully to form the mold, except that it is rather expensive unless all of the equipment is designed for that type of production. We believe that the spongy or porous castings sometimes obtained are due to use of too much binder, causing creation of an excessive amount of gas which is not conducted away rapidly enough.

Previously desulphurization was mentioned, and that is accomplished by the addition of 1½ ounces of metallic magnesium per 100 pounds of metal. The magnesium is added just before pouring, and the best form of magnesium is that in rod or stick form about ⅝-inch in diameter. The magnesium is held in iron tongs or a special holder so that it can be thrust under the surface until it dissolves. If the magnesium burns on the surface, it is of no benefit whatsoever.

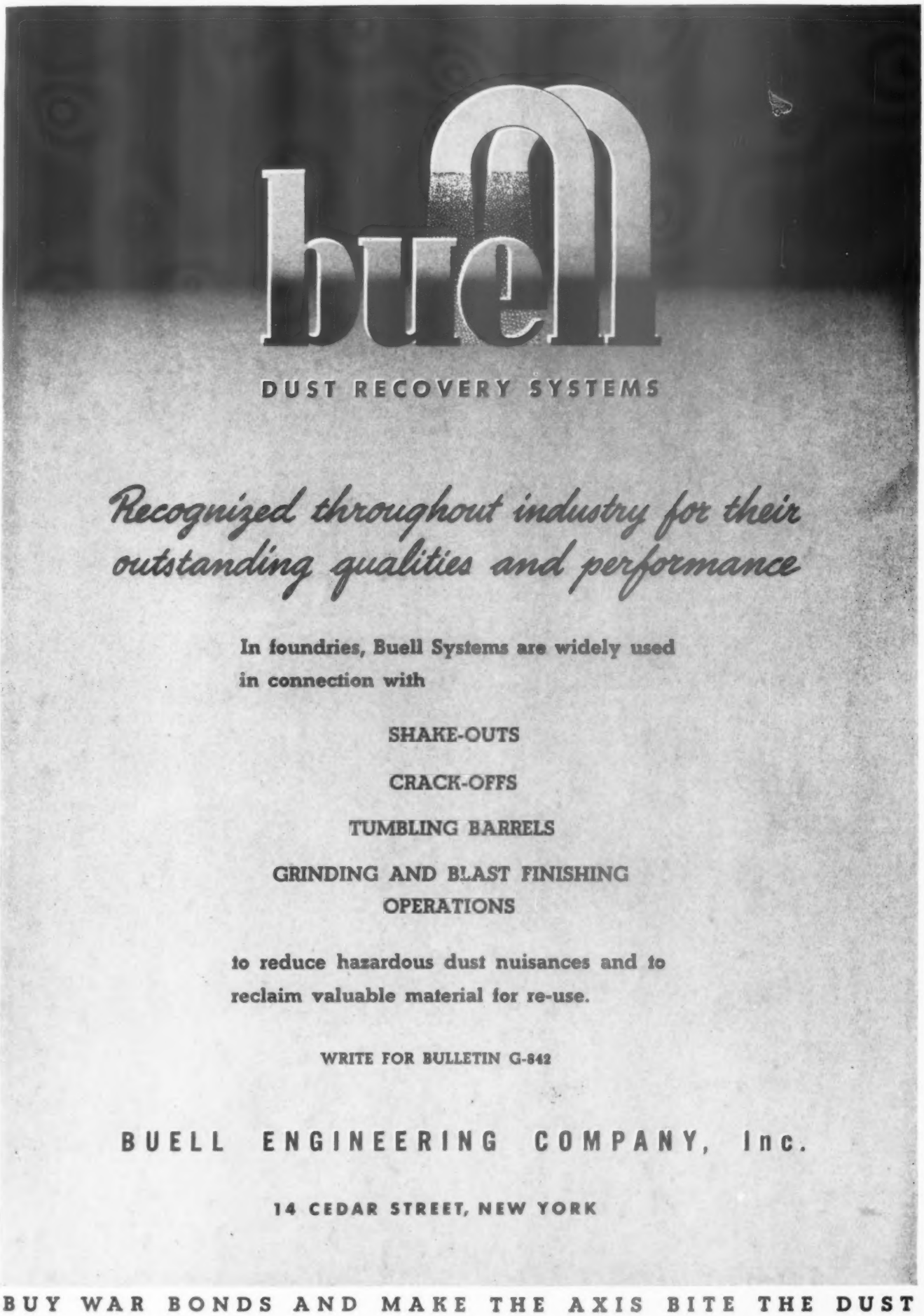
Iron Bricks Must Resist Wear

Q.—We have an order for several hundred white iron castings. They weigh from 200 to 325 pounds each, and are bricks for lining the upper part of a blast furnace at the bell. The face of each brick is 6 inches thick while the rest is only 1 inch thick. We have made some from special charges containing burnt stoveplate and grates, but the iron was hard to handle as it "died" quickly and skulled up the ladles. Is there some material such as sulphur that we can add to our regular iron, and pour 12 to 20 castings a day with our regular line of work?

A.—You do not state the average composition of the iron you are melting for your regular line of work, or what that is, and consequently it is difficult to determine whether you might be able to add some chromium to produce a white structure without increasing the cost too much. Also since chromium is one of the strategic metals, its use should be held to the minimum.

Perhaps with your regular composition, the use of about 1 per cent chromium in the ladle, and chilling the heavy face of the casting all around you can get a white structure throughout. However, since all consumers must exert their best efforts to conserve strategic metals, we believe that you should melt a special charge or two either at the end or the beginning of your regular run for the white iron castings. Use plenty of steel scrap in the charge so that a low silicon, low carbon iron comes over the spout. Employ heavy chillers to encompass the thick face of the casting. That practice may give the desired white fracture through the face, but if it does not, the addition of a small amount of chromium, say 0.25 to 0.50 per cent, will turn the trick.

You probably will have to do a little experimental work to determine the best and most economical procedure to produce the cast iron bricks so that they may be sold profitably.



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WRITE FOR BULLETIN G-842

BUELL ENGINEERING COMPANY, Inc.

14 CEDAR STREET, NEW YORK

BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

MEN ...of Industry

WALTON L. WOODY has been elected vice president in charge of operations for National Malleable & Steel Castings Co. with headquarters at Cleveland. Recently he had been assistant to the president and in charge of the Sharon, Pa., and Melrose Park, Ill., works. Mr. Woody joined the company in 1914 in Indianapolis following his graduation from Rose Polytechnic Institute. He was instrumental in establishing the company's first chemical laboratory. In 1938 he was made manager of the Sharon works and since then has directed substantial expansion programs there and at the Melrose Park works.

• • •

Harold W. Johnson has been made factory manager for the Round Oak Co., Dowagiac, Mich. The company recently completed facilities for production of magnesium aircraft castings and is also engaged in manufacture of other war goods and essential civilian items. Mr. Johnson previously had been foundry engineer and foundry manager for Greenlee Foundry Co. and North Western Foundry Co., respectively, both of Chicago. Graduated from Armour Institute of Technology in 1923, he was a designing engineer for Sargent & Lundy, Chicago, and later for the city of Chicago prior to joining the Greenlee and North Western companies in 1929. Mr. Johnson is a past chairman (1938) of the Chicago Chapter of the A. F. A. and has been a director of the chapter for 5 years.

• • •

R. C. Osterstrom, for the past 20 years connected with Pure Oil Co., has resigned to become vice president in charge of manufacturing for the Velsicol Corp., Chicago, producer of core oil and other petroleum products. Mr. Osterstrom has spent his business career in the petroleum industry. He joined Gulf Refining Co. after leaving school, and following service with the United States Navy in World War I, he became affiliated with Sinclair Refining Co. as assistant to the chief chemist at East Chicago, Ind. Joining Pure Oil Co. in 1923 as chief chemist, he subsequently became executive assistant to the vice president in charge of manufacturing. Recently, Mr. Osterstrom was manager of the Pure Oil refinery at Toledo, O.

• • •

Samuel H. Hummell, for the past 31 years actively connected with the Sterling Foundry Co., Wellington, O., successively as foreman, superintendent and vice president, resigned early in May after completing 48 years service in the foundry industry. Always a stickler for a clean shop, good equipment and high class castings, he had the satisfaction of seeing the output of machine tool castings at that plant rise from 100 tons per month 20 years ago, to between 1500 and 2000 tons per month in recent years. Mr. Hummell was born in Dale Borough, a suburb of Johnstown, Pa., in 1878 and had worked at several jobs before he entered a small foundry conducted by Julius Wild at the age of 17. He was the foreman when he quit 4 years later to see the country and increase his knowledge of the trade. He rambled north, south, east and west for about 12 years. Then, his curiosity satisfied and his competency established, he assumed charge of a small aluminum foundry in Wellington, O. A few years later he persuaded the owners to enter the gray iron foundry field. About 1920 the excellent quality of his castings attracted the attention of the Warner & Swasey Co., Cleveland. In recent years the entire foundry capacity has been devoted to this interest. During the next few years Mr. Hummell intends to a do a bit of touring, principally to places he missed the first time.

• • •

Raymond R. Ridgway, associate director of research for Norton Co., Worcester, Mass., was awarded the Jacob F. Schoellkopf Medal for 1943 at the May 20 meeting of the Western New York Section of the American Chemical Society at Niagara Falls, N. Y. He is the thirteenth recipient of the medal which is awarded annually by the section. Mr. Ridgway has been with Norton Co. since 1922 and is noted for

(*Continued on page* 106)

WALTON L. WOODY

O. E. OSTERSTROM

HAROLD W. JOHNSON

SAMUEL H. HUMMELL

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

(*Continued from page* 104)

his work in isolation and commercial production of boron carbide, the hardest known material next to the diamond.

♦ ♦ ♦

George Johnstone Jr., formerly assistant foundry superintendent at the Grove City, Pa. plant of the Cooper-Bessemer Corp., has been promoted to the position of foundry superintendent. Before joining Cooper-Bessemer, Mr. Johnstone served as foundry superintendent for William A. Hardy & Sons Co., Fitchburg, Mass. He was also instructor in foundry practice and technology at Girard College, Philadelphia, for several years. Mr. Johnstone received his foundry and metallurgical education at Temple University, Philadelphia, and Carnegie Institute of Technology, Pittsburgh.

♦ ♦ ♦

Walter E. Ellsworth, Indianapolis district manager for Claud S. Gordon Co., Chicago, has been elected chairman of the Indianapolis chapter, American Society for Metals. He has been associated with the Gordon company since 1939. Mr. Ellsworth was power plant engineer from 1915 to 1920 with Indiana General Service Co. at Muncie, and for the ensuing 12 years was industrial engineer with Maxon Premix Burner Co., Muncie. He became industrial gas engineer for Illinois-Iowa Power Co. in Champaign, Ill. in 1932, remaining there until joining the Claud S. Gordon Co.

♦ ♦ ♦

Roy L. Salter has been appointed general superintendent of the Southern Wheel Division of American Brake Shoe Co., with headquarters at 230 Park avenue, New York. A graduate of Alabama Polytechnic Institute, Mr. Salter joined the division in 1934 as assistant foreman at the Savannah plant. Five years later he became superintendent of the Portsmouth plant, and in 1936 he was transferred to the Southern Wheel plant at Sayre. The following year he was given a leave of absence to join the Association of Manufacturers of Chilled Car Wheels as engineer of tests, inaugurating the association's wheel inspection program. Mr. Salter joined Southern Wheel last fall as acting general superintendent of the nine plants operated by American Brake Shoe Co.

♦ ♦ ♦

George W. Anselman, associated with Ayers Mineral Co., Zanesville, O., as service engineer and superintendent of the company's Tennessee mill, has resigned to become service engineer, Goebig Mineral Supply Co., Chicago. Mr. Anselman received his training in metallurgy at Lewis Institute, Chicago, and served his apprenticeship at Western Electric Co., Chicago.

♦ ♦ ♦

Charles Chadwick, formerly of Meehanite Research Institute, New Rochelle, N. Y., has resigned to become assistant superintendent of the foundry of Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

♦ ♦ ♦

Ralph N. Fitzpatrick, formerly alloy foundry metallurgist, Midvale Co., Philadelphia, has become connected with the Electro Metallurgical Sales Corp., New York, as sales engineer.

♦ ♦ ♦

George O. Rowland, the Osborn Mfg. Co., Cleveland, has been appointed chief of the Industrial Brush Unit of the War Production Board, Washington.

♦ ♦ ♦

Bruce W. Burroughs, formerly with WPB, Cleveland regional office, has become general manager, National Bronze & Aluminum Foundry Co., Cleveland.

♦ ♦ ♦

O. J. Neslage has been appointed general sales manager of Sullivan Machinery Co., Michigan City, Ind., and **J. N. Rolston** has been named assistant general sales manager. Mr. Neslage has been associated with the company for many years, previously having served successively as manager of the Mexico City, Joplin, Salt Lake City and New York territories. Mr. Rolston has had 13 years of experience with the company, including 5 years as assistant general manager of Sullivan's Canadian subsidiary.

♦ ♦ ♦

L. R. Dohm, formerly secretary and treasurer, Warren Foundry & Pipe Corp., New York, has been elected president to succeed **Leonard Peckitt,** who has retired.

♦ ♦ ♦

W. J. Briggs, San Francisco, representative on the Pacific Coast for sale of foundry equipment and one of the oldest foundry supply men of that area, has retired from business.

♦ ♦ ♦

Leigh Willard has been elected a director, Allis-Chalmers Mfg. Co., Milwaukee, to fill the vacancy left on the board by the death of Max W. Babb. Mr. Willard also is president and director, Interlake Iron Corp.

♦ ♦ ♦

George W. Person, formerly abrasive engineer in the St. Louis territory, Norton Co., Worcester, Mass., has been appointed manager, abrasive division, Screw Machine Supply Co., a Chicago distributor of the Norton Co.

♦ ♦ ♦

Clarence E. Levoe, a recent graduate in metallurgical engineering, Colorado School of Mines, has been appointed to the staff, Battelle Memorial Institute, Columbus, O., and assigned to research on high temperature properties of metals.

♦ ♦ ♦

C. K. Swafford, works manager and member of the board of directors, Gisholt Machine Co., Madison, Wis., has been elected a vice president. Mr. Swafford originally entered the employ of the Gisholt company in 1913. Shortly after the United States entered the

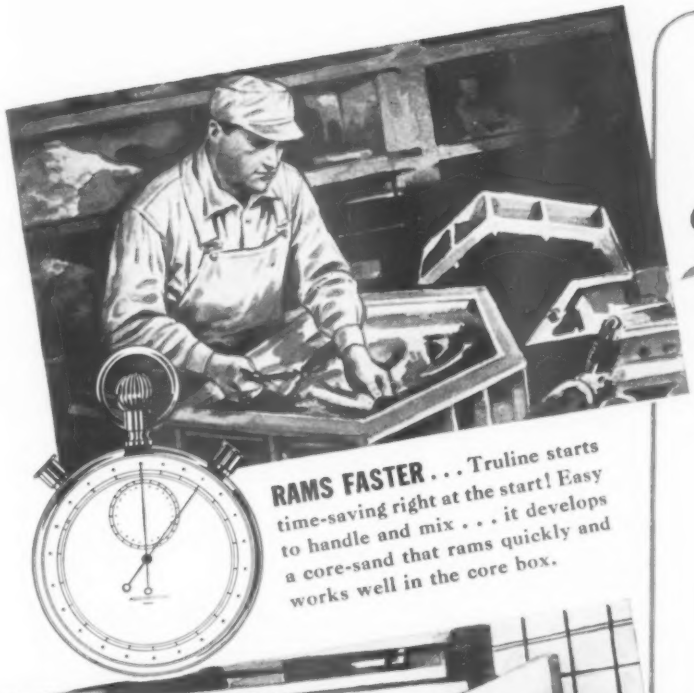
(*Concluded on page* 108)

GEORGE W. ANSELMAN

ROY L. SALTER

GEORGE JOHNSTONE JR.

WALTER E. ELLSWORTH



SAVES TIME all the time!

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JJ-64

(*Concluded from page* 106)

last war, he was transferred to other activities, returning to the company in 1930 as works manager. He will also continue to serve in that capacity.

♦ ♦ ♦

W. E. Jones, newly elected chairman of the Quad-City Chapter of the A. F. A., is plant superintendent of Ordnance Steel Foundry Co., Bettendorf, Iowa, and has been associated with the steel casting industry in that district for the past 32 years. Serving his apprenticeship in one of the large gray iron foundries in Great Britain, he came to this country in 1911 and obtained his first work as a molder in a gray iron foundry at Davenport, Iowa. Later the same year Mr. Jones became a jobbing molder with Bettendorf Steel Foundry Co., Bettendorf, Iowa, and subsequently was made successively assistant foreman, troubleshooter and foundry foreman. In 1932 he joined the Zimmerman Steel Co. of the same city, becoming its field representative in steel casting sales the following year. Mr. Jones returned to the Bettendorf company in 1936 as general foundry foreman, and 4 years later he was made superintendent of the Zimmerman Steel Co. which had become an affiliate of the Bettendorf company. His appointment as plant superintendent of Ordnance Steel Foundry Co. was made in 1942. The company is a government-owned plant operated by Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

♦ ♦ ♦

James G. Goldie, newly-elected president of the Northeastern Ohio chapter of the A. F. A. and the descendant of a long line of foundrymen, served his foundry apprenticeship with John Cochrane Ltd., marine engineers and machine tool builders of Barrhead, Scotland, where Mr. Goldie was born. During his apprenticeship he received technical training at Glasgow Technical College. Coming to America in 1923 he worked in various eastern foundries before taking charge of the foundry department of the Connecticut state trade school at Meriden. In 1929 Mr. Goldie went to Cleveland to establish the foundry department at the trade school there, and received his professional teacher training by attending Western Reserve University and the University of Akron. Instrumental in setting up apprentice and foreman training courses for numerous foundries, his courses have been widely used under the national defense training program. Mr. Goldie has been active in the American Foundrymen's Association, and is chairman of its apprentice committee.

♦ ♦ ♦

Luther A. Kleber, new chairman of the St. Louis District Chapter of the A. F. A., is assistant foundry superintendent, Commonwealth Division of General Steel Castings Corp., Granite City, Ill. His association with the steel casting industry dates from 1915 when he joined Taylor-Wharton Iron & Steel Co., Easton, Pa. Except for 2-years' army service, he served at Easton in various capacities until 1928 when he was transferred to the company's High Bridge, N. J. plant. During the next 12 years Mr. Kleber was successively assistant foundry superintendent, foundry superintendent and foundry manager at High Bridge prior to joining General Steel Castings Corp.

♦ ♦ ♦

W. Carson Adams, new chairman of Birmingham District Chapter of A.F.A., has been identified with the coal and coke industry since 1899 when he entered the employ of Galloway Coal Co. as a clerk in its mine office. Nine years later he became manager of sales for Alabama Fuel & Iron Co. and in 1914 also assumed sales managership of Maryland Coal & Coke Co., now the DeBardeleben Coal Corp. In 1919 Mr. Adams assisted in organizing the firm of Adams, Rowe & Norman, coal and coke wholesalers. He remained senior partner until 1941, when he withdrew from the firm to engage in the same business in his own name. Mr. Adams was vice chairman and director of the Birmingham District Chapter of A.F.A. from 1940 until h recent election to the chairmanship.

♦ ♦ ♦

R. M. Cherry has been appointed a sistant manager of the Industrial Hea ing Division of General Electric Co Schenectady, N. Y. He has been asso ciated with the company since 191 and with the Industrial Heating Div sion since 1936.

♦ ♦ ♦

E. J. Ellertson, purchasing agent, Cat erpillar Tractor Co., Peoria, Ill., ha been advanced to the newly-created po sition of general purchasing agent. Suc ceeding him as purchasing agent is W. H. **Steele,** assistant purchasing agent sinc 1929.

♦ ♦ ♦

Ralph H. Norton, board chairman, Acme Steel Co., Chicago, was re-elected president, Associated Employers of Illinois, to serve 2 years. **Charles S. Craigmile,** Belden Mfg. Co., was elected vice president of the association and **W. H. Hallsteen,** Ilg Electric Ventilating Co., treasurer.

♦ ♦ ♦

John S. Chafee, formerly vice president of Brown & Sharpe Mfg. Co., Providence, R. I., and since last November deputy director of the Tools Division of the War Production Board, Washington, has been appointed director of the division. He succeeds **George H. Johnson,** president, Gisholt Machine Co., Madison, Wis., who has resigned to return to private industry.

♦ ♦ ♦

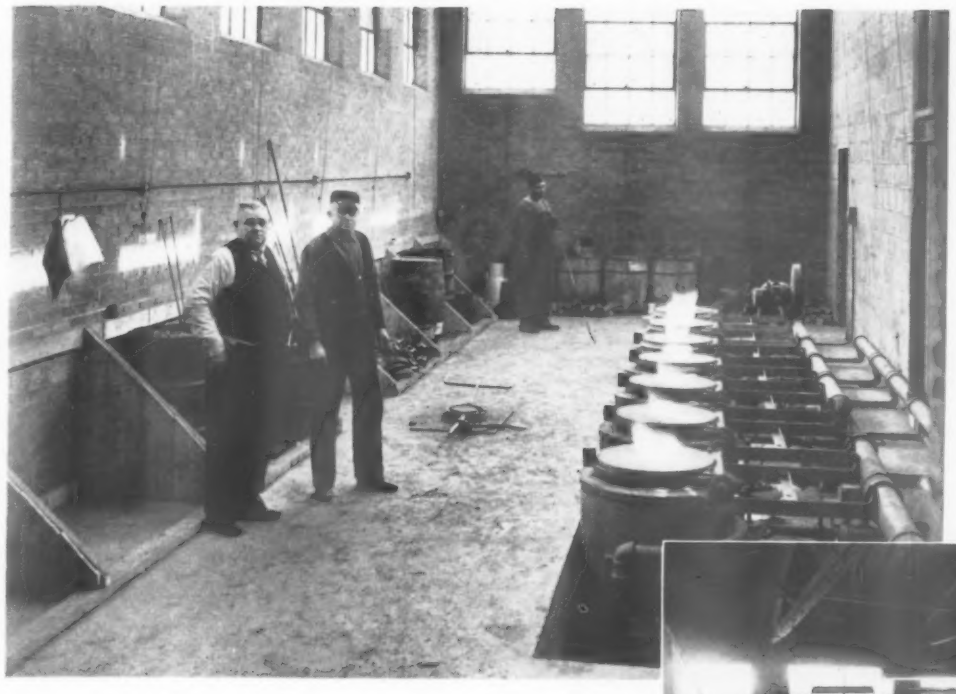
Lorin W. Grubbs, abrasive engineer for Norton Co., Worcester, Mass., in the states of Virginia, North Carolina, South Carolina and part of West Virginia and Tennessee, has been commissioned a lieutenant (j. g.) in the United States Navy. **Charles A. Babbitt,** who has had experience in the Norton research laboratories and in field work, will take over Mr. Grubbs' territory.

W. C. ADAMS

L. A. KLEBER

J. G. GOLDIE

W. E. JONES



Illustrations are from photographs taken at the George Adler Foundry, Cleveland, Ohio. At the left is shown a view of the seven stationary type crucible furnaces while below is a general view of the foundry. This installation uses natural gas fuel, 1100 BTU with multiple burners. The crucibles are standard No. 80's and No. 60's and the melting time starts at 50 minutes for the first heat and drops to 30 minutes in melting 225 pounds of high copper alloy.

*Photos and Data solicited on other Foundries using crucibles

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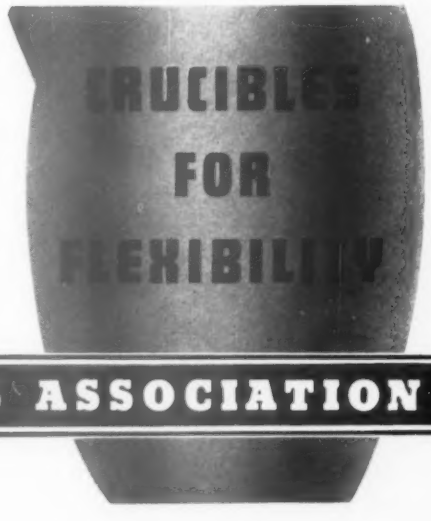
*
No. 2



CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK, N. Y.

Among the WEST COAST Foundries

BY A. H. ALLEN
Detroit Editor,
The Foundry

SEQUESTERED up in the Santa Cruz mountains back of San Jose, Calif., is Henry J. Kaiser's Permanente Metals Corp. Originally intended for a cement plant to supply material for the Shasta dam, now under construction in central California, the site now has been extended to include a ferrosilicon production plant and a magnesium reduction plant, as well as a small magnesium foundry.

Permanente has been the subject of more grousing and speculation among outsiders than any of the other Kaiser enterprises, and there are a dozen or more of them. The magnesium reduction plant, based on the much-argued Hansgirg process, has been shuffled around considerably since it first began to take shape, but it is now operating at about 75 per cent of capacity. The plant takes calcined dolomite, mixes it with carbon, reduces it to magnesium metal vapor in huge electric arc sealed retorts, cools the product in natural gas, condenses the vapor in gas fired retorts, then melts down the crystallized metal from the retorts in standard pots such as are used in most magnesium foundries, and casts the metal into either pigs or ingots.

Installed New System

There have been difficulties in getting the process perfected. Large agglomerators formerly used to collect the magnesium vapors emerging from the reduction units, for example, have now been thrown out and a new system installed. The melting department where magnesium collected from the sealed retorts is melted and cast for subsequent use, when visited by this writer, was a fog of sulphur dioxide. But this is simply a matter of getting the ventilating system into shape to remove these fumes which result from the sulphur thrown on the surface of molten metal to prevent its burning up.

Permanente officials—and most of them are young fellows still in their twenties or thirties with lots of zip and drive—say the operation is not working perfectly as yet, but they run over with confidence and say without batting an eye that they are going to "show up" the Dow Chemical Co. and its magnesium brine extraction process on costs.

Maybe so, but it is this observer's opinion that the long experience which Dow engineers have had in working out an economical magnesium reduction process, during which time they fooled around with nearly every known method in the books, will be a pretty hard thing to lick.

Already it appears that the ferrosilicon process or thermal reduction method for preparation of magnesium is moving ahead faster than the Hansgirg process at Permanente. In fact, Permanente itself is operating a ferrosilicon reduction process at Manteca, Calif., near the sea. Electro Metallurgical Co. has now started a large ferrosilicon reduction plant for magnesium at Spokane, and of course Ford in Detroit has been working with the method for some time. It is admittedly uneconomical at present when compared with the brine extraction process, but time may change this, although the Kaiser people themselves do not expect this eventuality.

Engineers Have Troubles

Another magnesium reduction process, electrolytic in character, is being operated at Las Vegas, Nev., where Basic Magnesium Inc. has set up a large plant. But this plant, too, has had its weary hours. The process has been shifted around appreciably and the original management tossed out and Anaconda Copper Co. engineers brought in to operate the equipment under a Defense Plant Corp. contract.

Indicative of some of the troubles which Kaiser's energetic engineers have had in getting Permanente into successful operation is the appellation given to one roadway extending between two groups of plant buildings. It is called, simply, "Aspirin Boulevard."

One of the newest operations at Permanente is the ferrosilicon plant, where a mixture of steel turnings, coke and quartz rock is charged in small electric arc furnaces and transformed into ferrosilicon, required in the "silicothermic" magnesium reduction process.

Stuck back into one corner at Permanente in a small out-of-the-way structure is a little magnesium jobbing foundry where experiments are under way in casting a number of different parts from magnesium produced in the adjacent reduction plant. A single melting pot, some wood flasks, patterns and a pile of sand were about all the facilities on hand when we visited the foundry, but it is admittedly experimental and not a production shop; engineers having more fun than anything else in seeing what they can do with the metal in turning out useful pieces of equipment of small size.

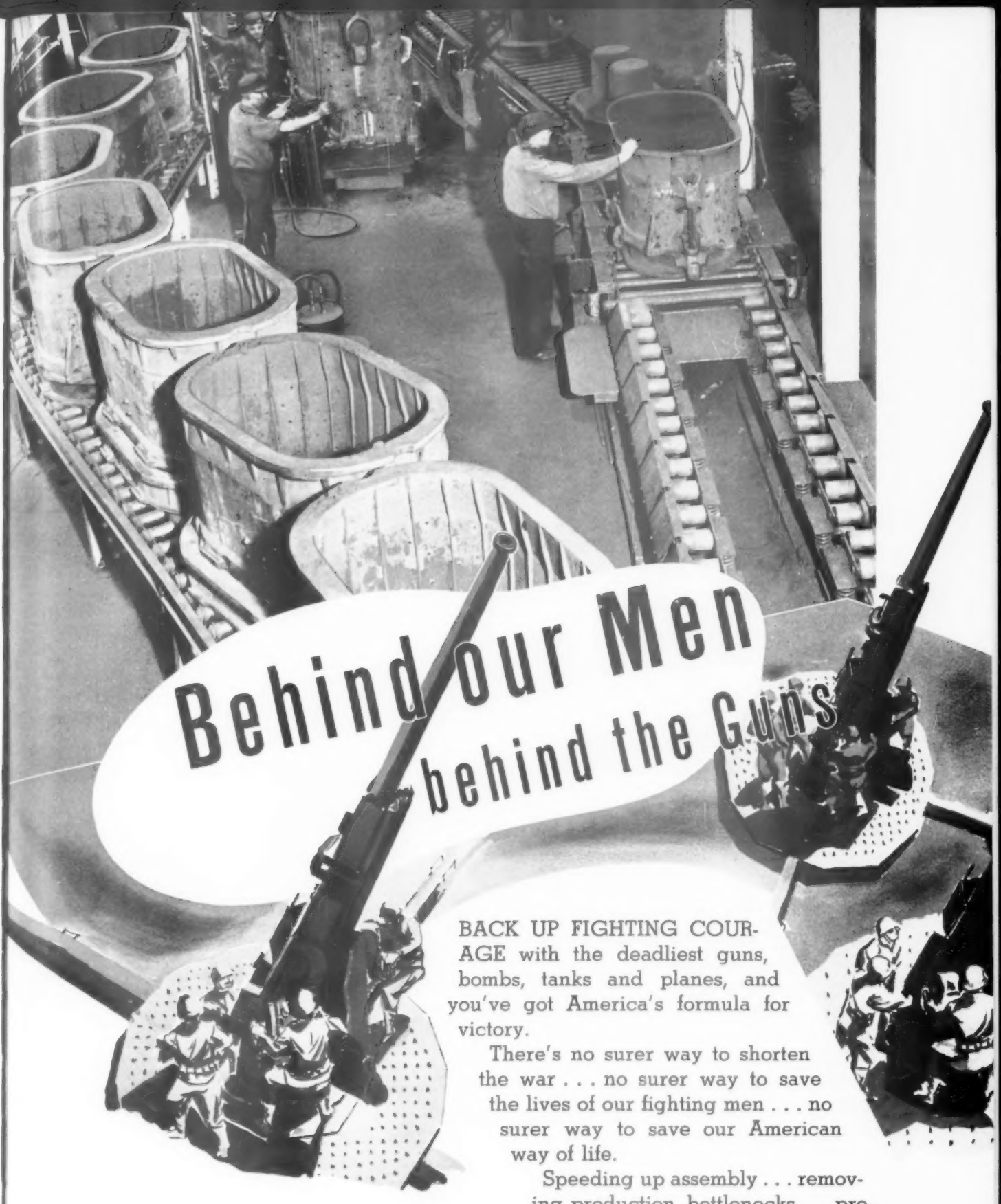
What will happen to all the West Coast magnesium facilities after the war is a debatable question. Obviously they can supply far more metal than anybody can see any useful purpose for now, since a large share of magnesium currently goes into incendiary bombs. As a construction metal, magnesium has not gone very far. A few engine parts here and there of the nonstressed type, a few experiments like those Northrop is carrying out in building up an airplane fuselage of magnesium sheet and in developing improved welding methods for magnesium—that about sums it up.

But it is reported that Kaiser has plans in the works for a 175,000-pound cargo plane built almost entirely of magnesium. And beyond that he is now talking about converting some of his shipyards into railroad shops after the war, where he will build freight and passenger cars of the light metals. This of course is just dreaming at the moment and while it may prove perfectly logical, it is difficult to see any bright future in the years just ahead for magnesium in any great quantity.

Future Looks Bright

Over the long pull, the future for the light metals up and down the 1500 miles of the West Coast looks exceptionally bright. Ample supply of cheap electric power is the key to the Pacific Northwest's stake in the light metals field, while in southern California, the predominant position occupied by the airplane industry is a favorable portent. True, the airplane industry will not be able to maintain its present pace after the war, but already the principal companies there are searching out the market for consumer goods to find out what they can produce besides airplanes to keep their plants running and their personnel employed. Since their work has been 85 per cent with the light metals.

(*Concluded on page* 112)

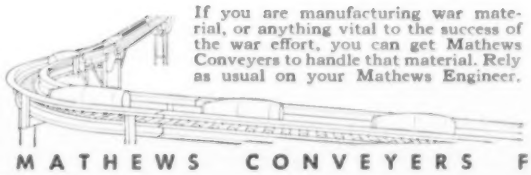


Behind our Men behind the Guns

BACK UP FIGHTING COURAGE with the deadliest guns, bombs, tanks and planes, and you've got America's formula for victory.

There's no surer way to shorten the war . . . no surer way to save the lives of our fighting men . . . no surer way to save our American way of life.

Speeding up assembly . . . removing production bottlenecks . . . preventing hitches in the speeding movement of vital war materials is Mathews' contribution to America's war effort.



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

(*Concluded from page 110*)

chances are good that they will extend this know-how into the fields of consumer goods manufacture.

In passing it might be noted that there are now some 64 aluminum foundries, large and small, operating in Los Angeles county alone.

Exploitation of Scappoose iron ores of Oregon has come to life with the terrific war demand for iron and steel for shipbuilding. It is recalled that in 1939 the Sierra Iron Co. was organized by one D. H. Botchford who planned to install a 500-ton per day electric furnace unit in a plant at Vancouver, Wash., to make high-phos pig iron from the Scappoose ore which is a limonite running around 50 per cent iron. The plan was to use the pig iron for production of cast iron pressure and soil pipe in an adjacent operation. The plant was started, a contract signed with the Bonneville Authority for power, but the entire project collapsed with the death of Batchford.

Currently, Yngve Cornelius, an inventor, is proposing to make use of an electric furnace he developed for glassmaking to reduce the Scappoose ores directly to sponge iron. He is reported to be operating a small pilot plant at Cascade Locks under the name Electrothermic Reduction Co. Cornelius' furnace is a simple rectangular type, lined with firebrick and having electrodes on opposite sides. Molten glass in the crucible serves as a resistance element through which heat can be developed to maintain the furnace at reduction temperature. The inventor proposed to place a charge of powdered iron ore, coke and limestone on an iron plate in the furnace, and to reduce the ore to a powder which can be briquetted and subsequently melted.

Olympic Steel Works in Seattle is a small steel shop which has been operating for a number of years in the jobbing field and currently finds itself loaded to the doors with orders for ship castings. Shipyard scrap is melted in a Green single-electrode furnace of about 2-ton capacity. Experiments with a new type of pouring head for certain types of castings—much lower and with larger cross section than is customary—have proved successful.

Experiences in Pouring Copper

WITH HIGH CONDUCTIVITY

By ARCHIBALD CAMPBELL
Assistant Foundry Supervisor
Ohio Brass Co., Mansfield, O.

IF YOU had asked us a year or so ago how to pour high-conductivity copper successfully we would have replied "Why pour it at all?—Save yourself a lot of grief and trouble!"

That's just what we were experiencing a year ago at the Ohio Brass Co., Mansfield, O., with this obstinate metal—a lot of grief and trouble—and red ink operation to boot. For we were losing as high as 20 per cent of our heats.

Today we lose one heat out of a hundred and we can make money on this class of business because we've learned—mostly via the school of hard knocks—some of the short cuts.

To begin with, our copper castings made from electrolytic copper in order to meet conductivity requirements (as high as 90 per cent), must not contain more than 1 per cent of zinc. This much zinc is a necessity in order to provide reasonably free machining characteristics.

Our first pouring attempts were pretty sad. A high percentage of the molds came back on the sprue and the castings were far from uniform because of the gas condition inherent in the melting and pouring of nearly pure copper. So we began to experiment. First we went after the oxidation problem—since molten copper has a great affinity for oxygen. Our best results today—as the result of our experiments along this line—are obtained by packing our crucibles (No. 60) with the entire 100-pound heat at once—even to the extent of cutting up sprues and gates to fit everything in. We then cover the copper with a layer of pea-size charcoal. To still further inhibit the oxidation process we use a crucible cover.

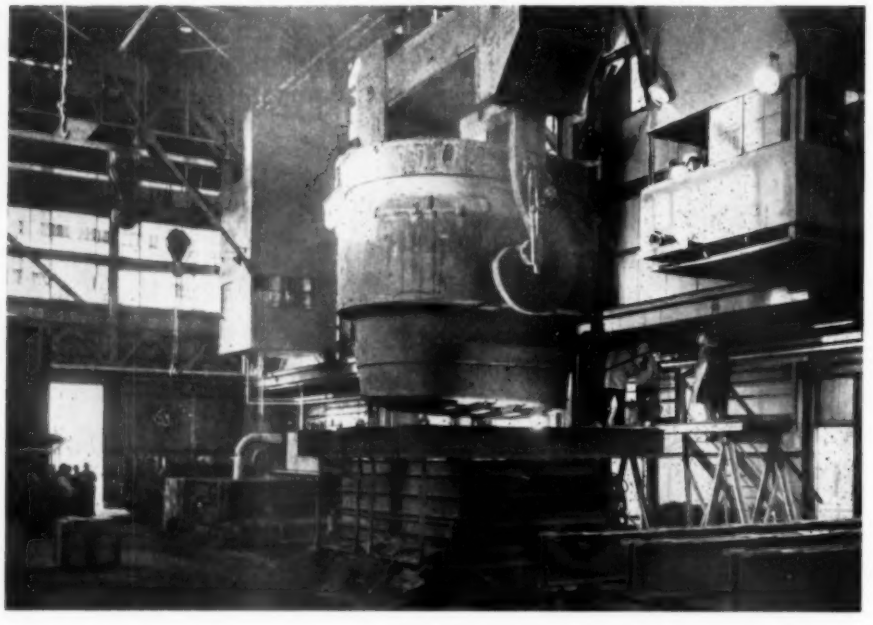
When the molds are poured we take an additional precaution by covering the sprue with dry sand. In this respect we have found sand to be quite as effective as charcoal and we have eliminated the annoyance of removing the latter from the sand when the castings are removed. Incidentally, the necessity of using a dry sand for molding cannot be emphasized too highly—the less moisture the better.

Our main degassifying agent, however, is phosphorus. We have found it to be relatively inexpensive and quite as effective as other recommended agents. The phosphorus is added in the form of 15 per cent phosphor-copper shot—3.2 ounces to every 100 pounds of molten copper. The shot is added just before the heat is poured and stirred in carefully with a carbon stirring rod.

Heats should never be poured at anything but high temperatures, around 2400 degrees Fahr. or higher if possible. We have found this to be essential in getting uniform, dense castings.

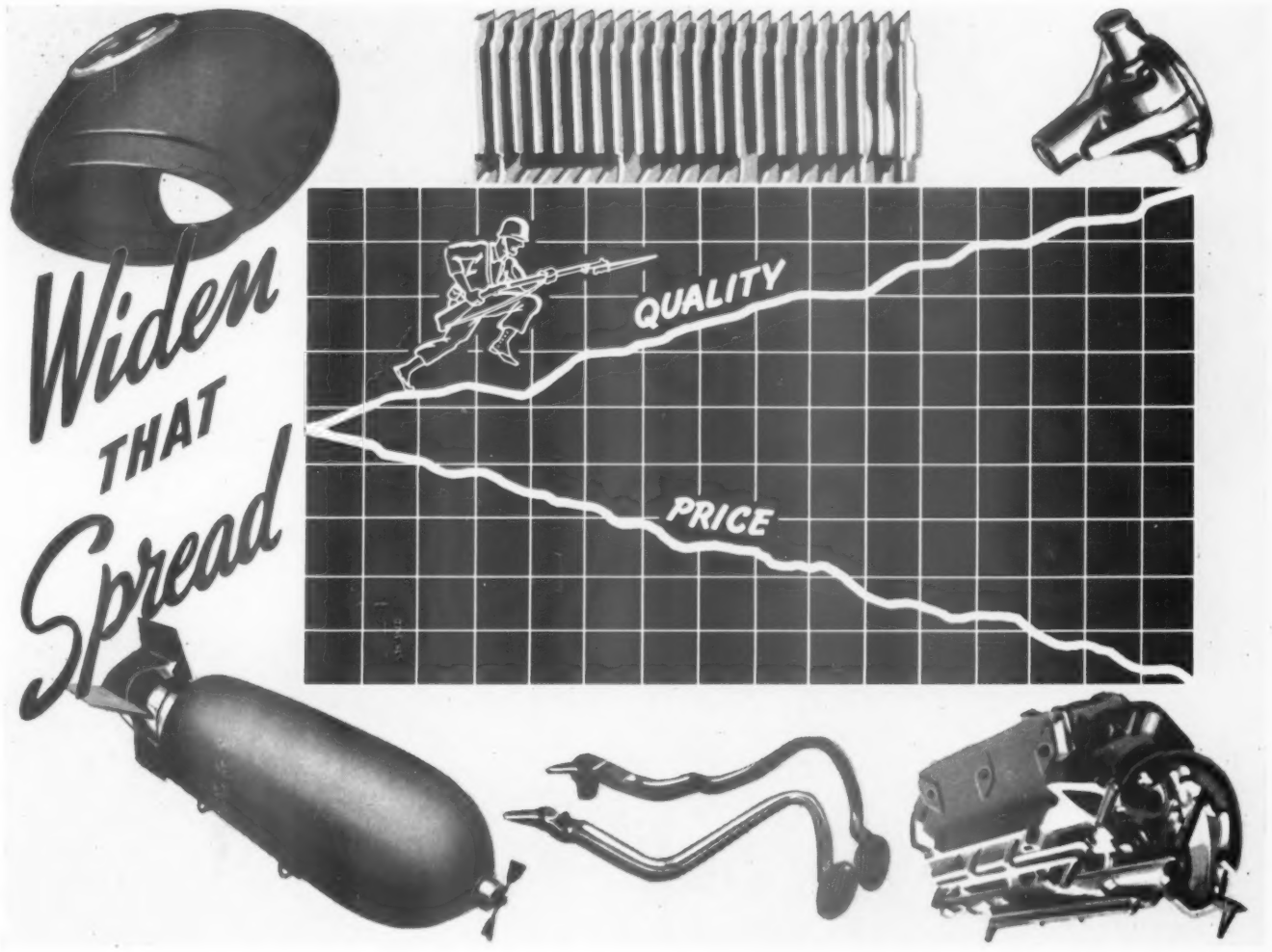
After taking so much care in properly degassifying the metal it need hardly be pointed out that adequate vents and risers to take care of escaping gas and provide for shrinkage should be provided.

Pour First Casting at New Steel Foundry



Pouring first casting at new steel foundry of American Rolling Mill Co., Middletown, O. Entire open hearth heats can be employed at this plant, which includes a bell-type annealing furnace capable of handling castings weighing up to 260,000 pounds. The company will operate the new unit under lease from the Defense Plant Corp.

Stewart-Warner Corp., is moving its executive offices from 1828 West Diversey Parkway, Chicago, to the twentieth floor of the Builders Building, 228 North LaSalle Street, Chicago. The move will make room for additional war work at the plant.



IF EVER the importance of quality was debatable, it is debatable no longer. Total war has taught us all that. To offer our country anything less than our very best would be exceedingly foolish. To offer *any customer* anything short of the quality thus attained would be unfair to our own cause.

The future of the foundry business depends upon its ability to raise the quality of its product and lower the cost of its manufacture. This means your *business*. It means *our* business.

Quality is *NOT* a question. The only question is, How can we keep reaching new highs in quality at the same or a lower price? The answer: *by means of new machines and new methods.*

Those new machines are now in the making. They are *your* machines. They should have *your* experience built into them. They can, if you will be kind enough to tell us what your problems are.

We believe that our broad background as practical foundrymen will enable us to interpret your needs and to satisfy them effectively.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

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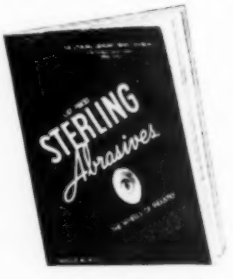
THE SWING FRAME GRINDER Is the Center of things these Days

THERE is an army of men in the foundries of our country . . men whose capacity for work guarantees the quality of almost every weapon of war being produced! Castings are vital . . critical . . necessary! Upon the speed of production depend the lives of our fighting men.

That explains why operators in your casting cleaning departments are speeding up. It explains why Sterling workers are turning out more than ever before. They realize that quality grinding wheels can turn out extra work for victory.



For quick reference, have the Sterling No. 43 Catalog in your file. Ask for it today.

Operators and foremen like Sterling Casting Cleaning Grinding Wheels. They handle easily . . turn out work faster - better! The reason is simple - the "Wheels of Industry" are built to the unusual demands of every grinding job . . grain, bond, size, structure and shape are correct for what you want them to do.

There is probably an easy way to increase casting cleaning in your departments. A survey may show how Stering Grinding Wheels can speed up production. May a Sterling engineer call?

A.F.A. WAR PRODUCTION CONGRESS

(*Continued from page* 97)

In this connection, the speaker pointed out that good, accurate descriptions of all operations cannot be overemphasized.

When the job descriptions are completed, they are reviewed by the committee and the number of points for each operation established to obtain the total number of points for the job. The work of the committee then is ended and it is the consultant's job to establish wage rates for the jobs evaluated, the higher rates being paid for the jobs with the higher number of points. Factors considered by the committee include: Responsibility, skill, education, dexterity or accuracy, mental effort required, experience necessary and working conditions involving hazards or physical effort and fatigue.

Second half of the session was devoted to a discussion of the job methods training program of the Training Within Industry Division, War Manpower Commission. C. T. Cardwell, chief, Training Within Industry in the St. Louis district, introduced C. F. Walther, who discussed this subject. In his introduction, Mr. Cardwell pointed out that TWI had developed the job methods training program to assist war plants in increasing war production by teaching skilled men in the plant how to improve manufacturing methods. TWI trains supervisors in groups of ten in five 2-hour sessions. These in turn serve as instructors within the plant teaching the method to other foremen and supervisors.

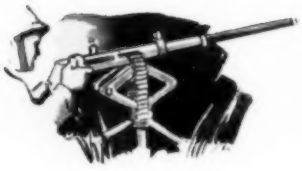
Mr. Walther followed with an outline of the training program. The plan is offered to companies which have had job instructor training and is applied to small jobs rather than as an overall layout. The program is separated into four steps, the first of which is to break down the job by listing all details in connection with the operation. The following step is to question each of the details listed with the questions: Why is it necessary and what is its purpose? Where is the best place for the operation? When is the best time to do the operation? Who is best qualified to do it? What is the best way to do it?

Step three is to develop a new method or to eliminate all details that are unnecessary. This is accomplished by rearrangement, combination or simplification. It is suggested to the trainees that they talk the problem over with fellow supervisors or those working at the job itself in order to get ideas. The next step is to apply the new method. To do so, the new method must be sold

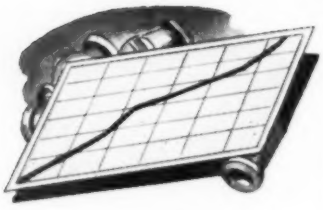
(*Continued on page* 118)

Informal views at the War Production Foundry Congress. Fig. 1—Clyde L. Frear, U. S. Navy; Fig. 2—Charles P. Albus, Hercules Powder Co., and Dr. H. Ries, Ithaca, N. Y.; Fig. 3—Roy Gezelius, General Steel Castings Corp.; Fig. 4—E. C. Troy, Dodge Steel Co.; Fig. 5—E. A. Rominski, Naval Research Laboratory; Fig. 6—Steel division luncheon meeting; Fig. 7—Henry D. Phillips, Lebanon Steel Foundry; Fig. 8—Robert E. Kennedy, American Foundrymen's Association; Figs. 9, 10, 12—Chapter officers and directors dinner; Fig. 11—K. L. Clark, Naval Research Laboratory; Fig. 13—C. E. Westover speaking at A.F.A. business session; Fig. 14—Herbert H. Blosjo, Minneapolis Electric Steel Castings Co.—Photos by R. H. Jacoby, Key Co., East St. Louis, Ill.

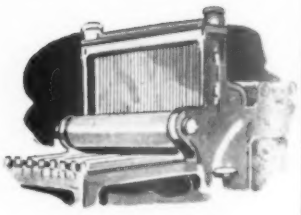
At Dayton Malleable Iron Co., Ironton, Ohio, over ten tons of difficult-to-clean truck housings for rear axles, 735 lbs. per load, were cleaned in the first eight hours' of operation of their new 48 x 42" airless Wheelabrator Tumblast.



A railroad specialty manufacturer is cleaning 35 machine gun bases, weighing approximately 22 pounds each, in only 18 minutes in a 36 x 42" Wheelabrator Tumblast. Previous cleaning time by hand –sandblasting was 3 hours.



The 27 x 36" Wheelabrator Tumblast is cleaning 750 lb. loads, consisting of air cleaner castings, air brake couplers, unions, nipples, etc. in only 4 to 6 minutes at Frazer & Jones Co., Syracuse, New York.



22 Tons of gray iron textile parts, such as treadle bars, gear blanks, loom pieces, etc., were cleaned in less than 5 hours at the Draper Corp., Spartansburg, S. C., using a 48 x 42" Wheelabrator Tumblast.

Wheelabrator *Speed Cleaning* Makes *Every Minute Count!*

THE TREMENDOUS wartime increase in production has necessitated a corresponding step-up in cleaning speeds to prevent stoppages in the flow of work.

A large percentage of war plants have answered this problem by installing airless WHEELABRATORS, because they reduce cleaning time to a matter of minutes. As a further consequence of this fast cleaning action, it is obvious that labor, space, and equipment requirements are materially reduced as well.

To visualize the advantages of the WHEELABRATOR as a speed-cleaner, be sure to read the typical case studies shown on these pages—they are indicative of the results you, too, can obtain. A demonstration, which we will gladly arrange, will prove that to your complete satisfaction.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

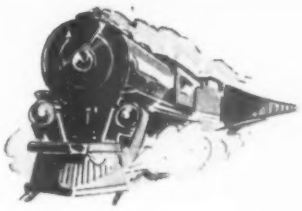
AMERICAN WHEELABRATOR

Replacing an airblast table, a Wheelabrator 6' Plain Tablast at the Reliable Pattern and Castings Co., Cincinnati, Ohio is cleaning brass and bronze castings in 1 5 the former time required.

A table of heat-treated gears is cleaned every ten seconds on a No. 1 Wheelabrator Tablast at a large Cleveland truck parts manufacturing company. The machine replaced pickling tanks, hand-wire brushing, and a pressure blast touch-up machine.

A 27 x 36" Wheelabrator Tumblast at American Crucible Products Co., is cleaning brass castings in approximately 5 to 8 minutes per load. The machine can do in 3 hours what originally took an airblast barrel 18 hours to do.

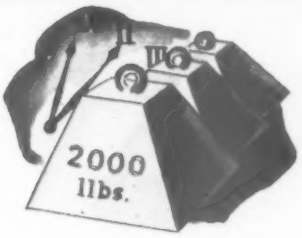
A large farm equipment manufacturer uses a No. 2 Wheelabrator Multi-Tablast for cleaning heat treated tractor bull gears weighing 70 to 80 lbs. apiece. The machine is cleaning about 8,000 lbs. of gears per hour.



Typical performance of the 48 x 48" Wheelabrator Tumblast at Westinghouse Air Brake Co.:

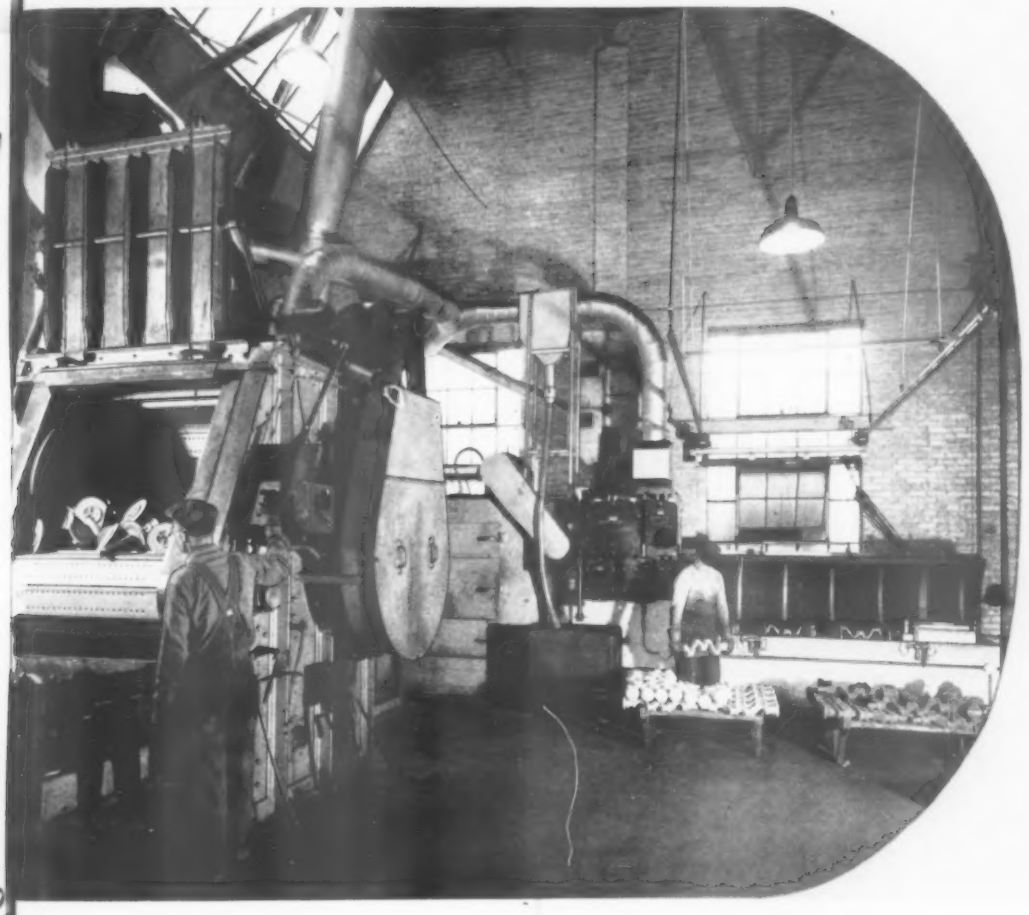
60 service valve bodies, 35 lbs. each (2100 lbs.), 6 minutes.

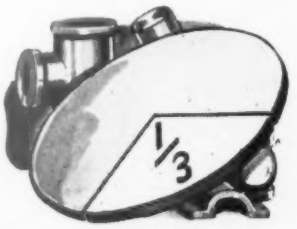
26 pipe brackets, 65 lbs. each (1625 lbs.), 5 minutes.



A large Toledo steel foundry, using a Wheelabrator Tablast having two 60" diameter tables, is cleaning approximately 3 tons of green and annealed steel castings hourly.

A No. 2 Wheelabrator Multi-Tablast at Continental Motors Corp., Detroit, cleans cylinders, gears, connecting rods, etc. so fast that the time of their cleaning operations has been reduced from three full shifts to only six or seven hours daily.

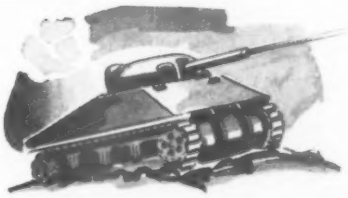




The 36 x 42" Wheelabrator Tumblast at Bierman-Everett Foundry, Irvington, N. J., cleans loads of brass castings in 4 minutes and gray iron castings in 6 minutes. Cleaning time is 1/3 of that required with their former equipment.

A New York manufacturer is cleaning about 35 tons of gray iron and brass castings per day in a 36 x 42" Wheelabrator Tumblast. The previous cleaning cost of $3.96 per ton, using sand blast barrels, was reduced to $1.56 per ton by the Wheelabrator.

Over 60 tons of brass fittings including the gates and risers, are being cleaned daily in a 36 x 42" Wheelabrator Tumblast at Ohio Injector Co., Wadsworth, Ohio. Only three and a half minutes are required to clean each load.



A monthly cleaning production of 32,000 tank tractor blocks and 64,000 bushings is not unusual for the 27 x 36" Wheelabrator Tumblast in an Ohio plant. This machine operates about 18 hours a day, six days a week, averaging 6 loads of castings hourly.

AMERICAN

FOUNDRY EQUIPMENT COMPANY

505 SOUTH BYRKIT ST. · MISHAWAKA, INDIANA

Medal recipients of the 1943 convention, left to right: Rufus F. Harrington, Hunt-Spiller Mfg. Co., Boston; Carl F. Joseph, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.; Stanley W. Brinson, Norfolk Navy Yard, Portsmouth, Va. (Below)—One of the technical sessions on brass and bronze founding

(*Continued from page* 115)

both to the executive and to the operator who is to do the work. After this approval, the new method should be put into effect at once. The training program will work on any job within three fundamental types of work including material handling, machine work and handwork. In the discussion regarding the job methods training program, it was emphasized that executives should follow through constantly to keep up interest in the plan and to see that improvements are being made.

In the discussion period which followed, it was asked if labor and management found it difficult to get together on job evaluation programs. In answering, Mr. Peck again emphasized the need for accuracy of the job descriptions. Evaluation is only as good as the description, and it should be under the direction of an impartial consultant. Mr. Wartgow said that in his experience in working on such a committee where there were arguments, the whole committee went out into the plant and watched the operation performed, and the arguments were cleared up easily. Mr. George stressed the need of standardizing a job before it is evaluated in order to set up a uniform wage rate.

The foundry foremen training group, under the chairmanship of W. G. Conner Jr., Walworth Co., Washington Park, Ill., and with W. E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, as vice chairman, held a panel discussion on foreman training problems Thursday evening. Assisting in the discussion were George J. Leroux, National Malleable & Steel Castings Co., Cleveland, and Frank E. Wartgow, American Steel Foundries, East Chicago, Ind. Subjects discussed included: The foremen's place in reducing absenteeism; the foremen's place in job evaluation and time study and methods and plans for foreman training.

Second half of the meeting was devoted to an explanation of the job relations training course by Harold T. Smutz, assistant district representative, Training Within Industry, St. Louis. Mr. Smutz was introduced by C. T. Cardwell, chief of that branch in the St. Louis District.

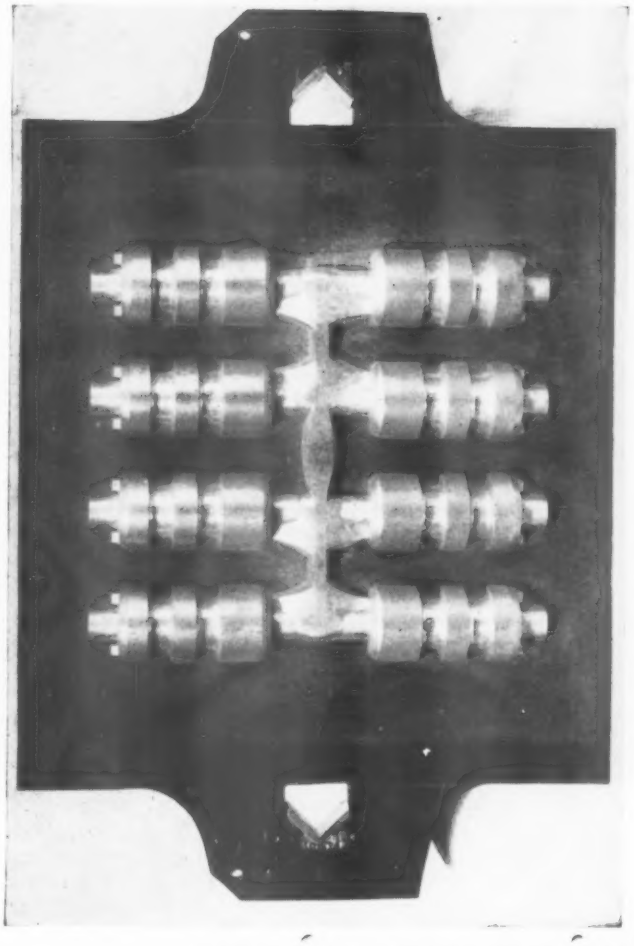
Mr. Smutz stated that the training program is presented in a 48-hour course comprised of six 8-hour days. The country has been divided into 22 districts and each district has an institute where the course is presented. Companies desirous of having the program are invited to send a representative for training. Upon completion of the course this representative can return to the plant and serve as a trainer of the supervisors there.

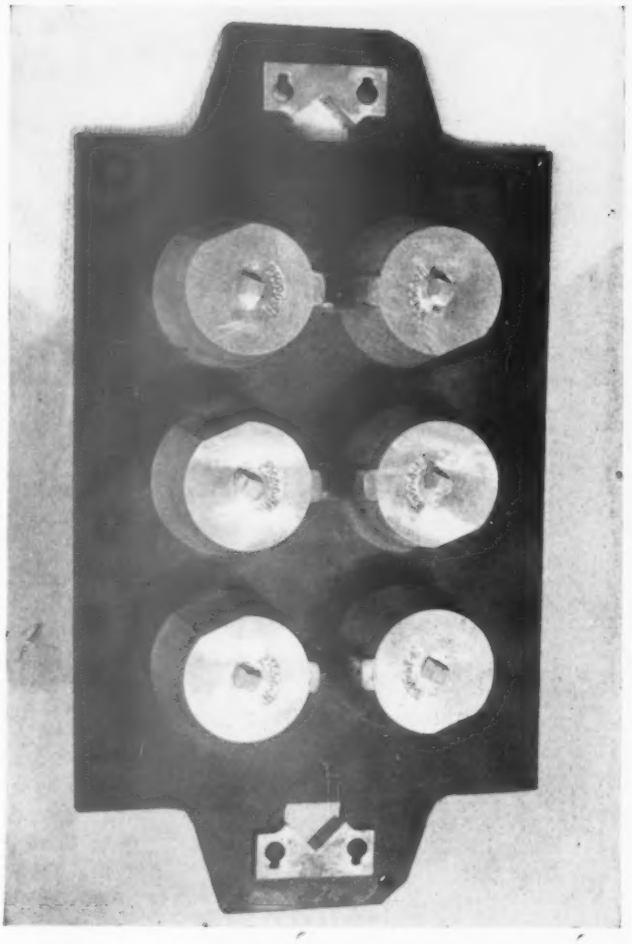
Practical points outlined as a foundation in job relations, or the science of getting along with people, were: Let each worker know how he is getting along; give credit when credit is due; let each worker know in advance about changes that will affect him; make the best use of each person's ability; and treat them as individuals. Supervisors are confronted with various problems that must be solved. As an aid to the solution of these problems, Mr. Smutz suggested the following steps: Get the facts; when they are obtained weigh and decide; take action; and then follow through.

In a meeting on safety and hygiene held Friday afternoon under the direction of James R. Allan, International Harvester Co., Chicago, R. I. Thrune, Dow Chemical Co., Midland, Mich., spoke on "Fire Prevention and Control in Magnesium Foundries." He said that fine magnesium dust constitutes the greatest fire and explosion hazard. Such material should be kept wet, not moist, since with 5 to 40 per cent water it will ignite and burn vigorously. Iron scale and brick dust should be cleaned out

(*Continued on page* 120)

LIGNOLITE





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(*Concluded from page* 118)

of melting furnaces, since they promote burning of metal spilled in the furnaces. Air and oil lines to the furnaces should be located so that they can be shut off in case of fire. In case of fire within the furnace due to breaking of a crucible, magnesium flux or the various powders can be used to retard the fire.

Crucibles should be checked regularly to see that they do not become too thin. Coating the exterior surface with aluminum aids in reducing scaling. All tools and fluxes should be preheated to eliminate moisture. Sprues and risers of molds should be covered to prevent entrance of foreign material which might result in fire when struck by the molten metal. Fire retardant clothing should be worn by men pouring off, and quick operating showers should be located at strategic points in case of clothing fires.

Sludge from grinding and other operations can be buried in the ground if the amount is small. Large amounts should be burned in a location as far away from other buildings as possible. Mr. Thrune said that at his plant a firebrick or paving block floor, built at an angle to provide drainage, served for burning. The sludge was spread out on the floor, covered with burnable refuse, and the latter ignited. This method not only dried out the sludge slowly, but formed a cover which reduced the smoke and light generated during the operation.

Prevent Furnace Fires

To prevent fires in heat treating furnaces, only castings free from sawings and dust should be admitted. The furnaces should have adequate temperature control devices, and about 7 per cent sulphur dioxide gas should be present. When fire does occur the doors should be opened and the burning castings covered with a powder such as G1, which is sprayed through a hose and nozzle so that it can be directed to the proper location.

Second paper was presented by John Kane, American Air Filter Co., Louisville, Ky., on "Mechanical Exhaustion of Fumes and Smoke, the Engineering Aspects of Collection of Dust and Fumes in Nonferrous Foundries and Industrial Operations." He pointed out that in magnesium foundries the most important phase of dust collection is the ease of ignition of such material. Hence, the dust must be conducted immediately to a receiver where it is immersed in a liquid. The unit type of system with its short duct is the best solution. He described equipment incorporating controls which made it impossible for an operator to grind or polish a casting if sufficient liquid was not available to handle the dust. Numerous other aspects of dust collection were discussed.

Final paper on "Health Aspects of Safety and Hygiene Problems in Magnesium and Other Foundries" was presented by Warren Cook, Zurich General Accident & Liability Insurance Co. Ltd., Chicago. He said that workers in good physical condition were less prone to accidents. To inculcate ideas of good physical health it was necessary to provide an educational program. Use of visual mediums, such as strip film movies followed by presentation of folders on the same subject, gave good results since the interest was extended beyond the brief showing of the film.

Good health involves a complete medical department if the plant is large, or the services of industrial nurses or similar organizations in small plants. Close attention should be given to provide good working environment. Working conditions and health of employes should be checked from time to time to see that they do not get out of hand. Mr. Cook mentioned that when the atmosphere contained over 10 parts per million of sulphur dioxide, irritation of membranes occurred, and that the safe limit for fluoride concentration was 20 milligrams per 10 cubic meters.

In reply to a question on trouble with magnesium oxide in the atmosphere, Mr. Adams of Dow Chemical said that no trouble was encountered, although in brass foundries the presence of zinc oxide around 15 milligrams per 10 cubic meters caused zinc shakes. Mr. Adams stated that with fluorine compounds it was necessary to spray cores in a ventilated booth, guard against mold and fume smoke, and also ventilate the hot shakeout. Difficulty with fume and smoke at the molds can be decreased greatly by covering with a layer of molding sand immediately after pouring. Men should be instructed to keep as far away from hot castings as possible, and good general room ventilation should be provided. He also said that sores, etc. from magnesium splinters usually was caused by other infection.

HEADING AND GATING

Is Topic of Annual Lectures

ONE of the features of the convention is the annual series of lectures devoted to some important phase of foundry operation. This year the subject under discussion was heading and gating of castings. Sessions were held each afternoon of the three days and were arranged by William G. Reichert, W. G. Reichert Engineering Co., Newark, N. J. Types of castings covered included aluminum and magnesium, steel and gray iron, and discussion leaders included R. E. Ward, Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J.; Howard F. Taylor, Naval Research Laboratory, Anacostia Station, Washington, and W. G. Reichert. Mr. Reichert also presided as chairman of the first two sessions while Pat Dwyer, THE FOUNDRY, was chairman at the third.

In discussing the heading and gating of aluminum and magnesium castings on Wednesday afternoon Mr. Ward pointed out that they should be designed properly to offer optimum castability and soundness. The design engineer when laying out a casting should not only determine whether it will have the final dimensions he desires, but also whether the design is one that offers ease of casting. Primary thought about this matter will often save many hours of wasted foundry time and eliminate later redesigning of the casting which might be more costly and time consuming.

After pilot castings are made from a new pattern and the gating and risering has been worked out to give a satisfactory casting, the gates and risers should then become a permanent part of the pattern and no changes in the method of gating or risering should be made in production without a complete study of the effect of these changes. Standardization of molds after a satisfactory casting has been produced will do much to minimize the foundry scrap losses.

Due to the lower density of aluminum and magnesium and the high solidification shrinkage, it is necessary that large, high risers be incorporated on most castings. It is often advisable to incorporate a pouring cup on top of the flask to further increase the sprue height and thus increase the hydrostatic pressure of the liquid metal in the mold pattern. Gates and risers should be well rounded and filleted to prevent shrinkage cracks at the point of contact with the casting.

Generous use of chills is accepted practice in most light metal foundries. Copper alloy or cast iron contour chills have been found most helpful; cast iron probably being the more widely used.

Due to the rapid rate at which oxidation occurs in aluminum and magnesium, it is necessary that the metal be admitted to the mold with the least turbulence possible. It is not practical to drop the metal into the mold cavity, and, for that reason, top gating is seldom used. Bottom gating, often of the ring gate type, has given best results.

High sprues should be stepped to reduce turbulence in the sprue. Pouring basins are advocated by many, especially in magnesium, to minimize the turbulence of the metal entering the sprue. Strainer cores, perforated screens or slotted sprues are used in magnesium molds to entrap oxide and dross which form in the sprue. Some work has been done with swirl gates, but, at the present time, this method is not commonly used.

In designing gates and risers, it should be borne in mind that the metal should enter the mold cavity in a uniform, uninterrupted flow with fairly high velocity. The metal should be poured as close to

(*Continued on page* 122)

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(*Continued from page 120*)

the lip of the pouring cup as possible and the stream from the ladle should not be broken. Careful fluxing and removal of the flux preparatory to pouring will insure clean metal and the absence of flux inclusions which have a marked effect on the corrosion resistance of light metal alloys especially magnesium.

To summarize, the castings should be gated, risered and chilled in such a manner as to allow the metal to enter rapidly, quietly and at uniform temperature at the base of the mold cavity and rise evenly through the mold to fill large, well filleted risers, giving, as a result, a uniform temperature gradient from the base to the top of the casting.

Discuss Various Risers

The second meeting on gating and risering of steel castings was held Thursday afternoon and was conducted in round table fashion with Howard F. Taylor, Naval Research Laboratory, Anacostia Station, Washington, calling for discussion from the floor upon carefully chosen topics of current interest with only enough introduction of the subject to initiate expressions of opinion. Among the items covered were: 1. The shop use and efficiency of "Washburn" or "necked down" risers; 2. Importance and methods of control of temperature gradients by gating and risering, and 3. The use of carefully designed and prepared risers patterns instead of random choice. Henry Phillips, Lebanon Steel Foundry Co., Lebanon, Pa., discussed the use of Washburn risers in his plant pointing out that they were very successful and more economical than conventional types. They are used on the contoured sides of castings as well as upon flat surfaces. He described in detail the types of necking cores used and stated further that wherever possible, the risers were blinded to save metal. Use of special graphite cores placed horizontally across the upper part of blind risers to keep them open to the atmosphere was mentioned, but described in detail at the steel round table luncheon on Friday. Others discussed the use of knock off risers, both as to applications and limitations, and it was generally agreed that their popularity was increasing.

S. W. Brinson, Norfolk Navy Yard, Portsmouth, Va., was called upon to discuss the influence of bottom and top gating upon the thermal gradients within a solidifying casting and he gave a very clear and useful explanation of his views. He mentioned that in his opinion bottom gating through risers gave sounder metal than bottom gating with risers at the top because the mold filled more slowly and part of the shrinkage was taking place while the metal was rising in mold and riser simultaneously. This theory was based upon the premise that if a casting could be poured slowly enough it would not need risers at all, a practical impossibility but a theoretical fact. E. C. Troy, Dodge Steel Co., Philadelphia; J. A. Duma, Norfolk Navy Yard, Portsmouth, Va., and Mr. Phillips clarified the additional factors involved such as metal turbulence, preheating of the mold, and the insulating effect of risers placed at the side, rather than above castings.

J. R. Adams next discussed the use of carefully prepared riser patterns as to design and care in seeing that they are painted or shellacked. He pointed out that round risers are the most efficient shape and that in so far as possible, his company preferred them. He stated that painting or shellacking was particularly important in preventing excessive drying at the sand-pattern interface, especially with synthetic sands. Mr. Adams then discussed in detail a clever innovation in the use of blind risers developed at his plant. He uses a cover core with a hole in the center to accommodate a small paper drinking cup filled with piping compound. The upper edges of the cup are curled over and sand rammed on top of the cup and core. As the metal rises in the riser, the bottom end of the cup burns open and empties the contents on top of the metal which serves to keep the riser open to the atmosphere.

Test bar molds were discussed briefly and comment requested. Mr. Troy described a new type he has been working with in which round bars 1 inch in diameter were molded vertically around a large central riser and gated at the bottom. This method saves cutting off costs and make it possible to keep the flame cut away from all except one end of the bar. He had not done enough work to know if center line shrinkage would be eliminated but at least if it was present it would be in the very center of the bar rather than displaced at random. It was agreed that this type might have excellent possibilities. After a brief description of making castings by bleeding and centrifugal methods, the meeting was closed by Mr. Reichert.

Castings Must Be Sound

In the final lecture held on Friday afternoon gating and risering of cast iron was discussed by Mr. Reichert. It was pointed out that high strength iron mixtures and the use of alloys play a valuable part in the industry but the fact should be recognized that these foundry tools are worthless until sound castings can be produced.

Directional solidification as applied to the manufacture of castings is successful only when certain principles of casting design are adopted. These principles stress the importance of feeding smaller sections through heavier ones. It is only when the temperature gradient in the mold and in the metal are such that feed heads are the last portions to solidify that sound castings can be produced.

To prevent isolated hot spots in the casting it should be designed so that the shrinkage can move from all members of the casting to the risers.

Illustrations were offered by Mr. Reichert to show that the shrinkage will vary according to the composition of the metal and that high total carbon irons will have a lower shrinkage value than lower total carbon irons. Therefore, it often is necessary to provide a gating and risering practice within general limits of metal composition.

In a gating system the mass of metal must be considered. The greater the mass of metal the slower it will cool, due to the fact that the area exposed to the sand in one case is considerably less than that exposed to the sand in another. For example, with a mass of iron 5 x 5 x 5 inches and one 25 x 5 x 1 inches, the weight of metal in both cases is the same but the surface area exposed is entirely different. In the one case the surface area is more than double that of the other. Therefore, it has twice the opportunity of dissipating the heat and the solidification may be 3½ times as fast, consequently the internal shrinkage will be quite marked in the larger mass.

If all the metal in the mold could freeze at exactly the same instant and cool off at exactly the same rate there would be no internal shrinkage. This would be the perfect condition.

Pour Hot Iron

In some foundries all castings large or small are poured on the dull side. If the metal is hot it is chilled by adding scrap to the ladle. However, when the iron in one foundry was increased in temperature and poured hot for pressure castings, the machine shop losses from leakers, shrinks, dirt, and spongy metal dropped so suddenly that it served as conclusive proof that hot pouring was essential to pressure type castings. In fact, the improvement in the machine shop was so marked that hot pouring was required. Pouring temperatures which are too low even if sufficiently high to avoid cold shuts may not permit risers to perform their primary function of feeding the casting or to carry off slag, dirt and dross.

Another factor that is of prime importance is the effect of pouring rate. Theoretically it is possible to pour a casting without risers if the rate of pouring and temperature of the metal is correct. This "rate of pour" is a critical value and deviations from the exact rate will result in one of two conditions,—if the rate is too high, shrinkage will be found, and—if the rate is too low, the outside of the casting will show laps or cold shuts and other defects such as scabs and pockmarks.

If the "rate of pouring" is kept as low as is practical the riser may be diminished and soundness improved. However, this does have certain disadvantages—tending to produce scabs, buckles and lower strength iron. Therefore, it is considered good practice to pour the metal hot and at a fast rate to obtain uniform temperature gradients in the metal and mold and to obtain the highest strength and then provide risers according to methods for controlled directional solidification.

If heavy sections are located in inaccessible places where risers cannot function the use of chills must be resorted to. These may be used either externally or internally. A chill will equalize the rate of

(*Continued on page 125*)

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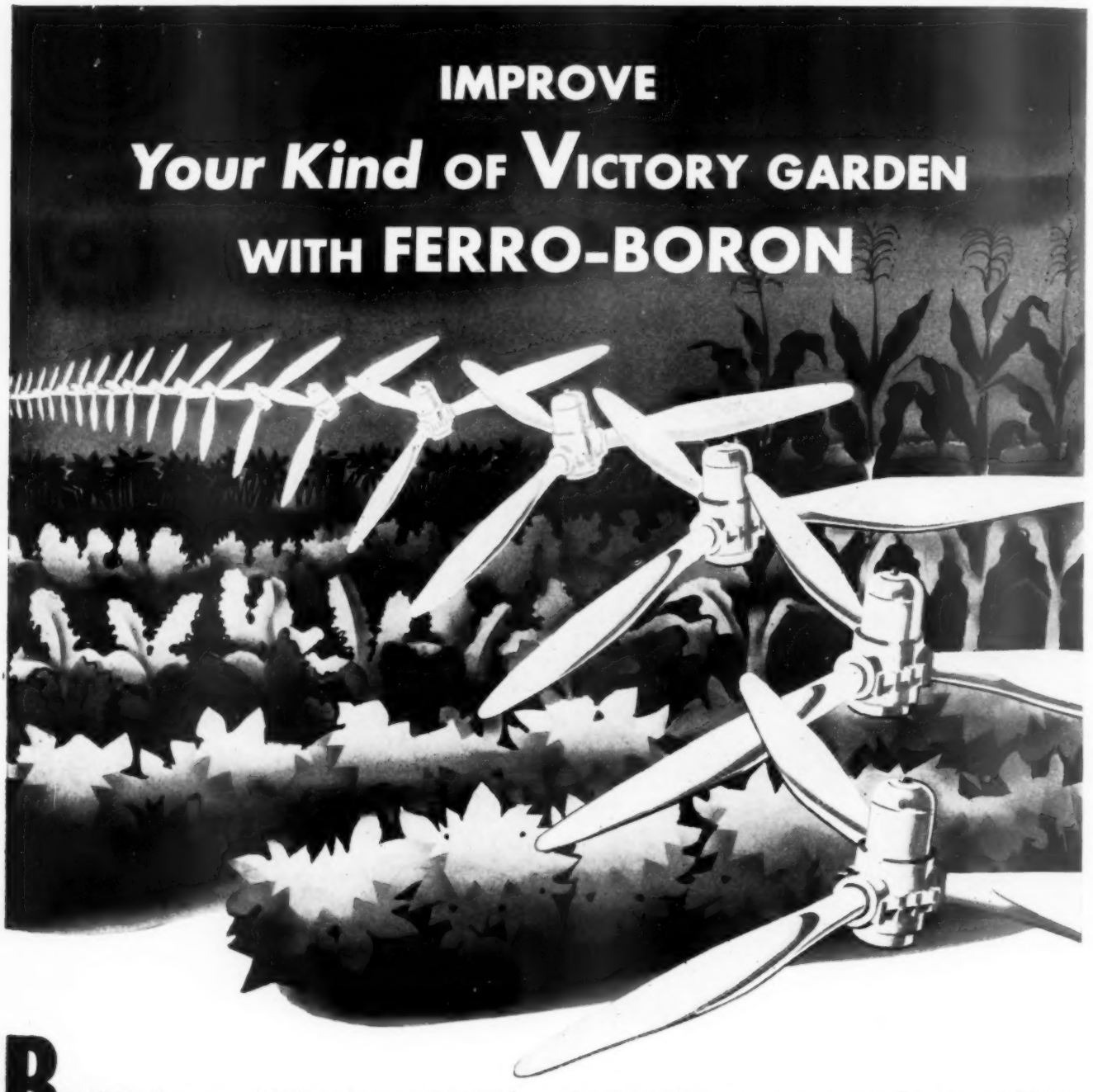

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(*Continued from page 122*)

solidification and help both gating and the feeding of the casting to eliminate porosity.

An external chill shaped to the contour of the casting accelerates the cooling and solidification of that part of the casting affected. An internal chill usually of a composition similar to that of the casting to be poured is placed in relatively heavy sections of the mold, so that the liquid steel completely surrounds it and in so doing accelerates the cooling and the solidification of the metal at that point. Very often chills are placed in cores to equalize the cooling rate on a heavy section.

It was pointed out that if external chills are too small they do not balance the cooling rate and shrink cavities will be found, while if too large they are likely to cause small surface cracks. Experience and good judgment are necessary in selecting the correct size of chill to maintain this balance.

It should be remembered that chills must be thoroughly clean to prevent undesirable chemical reaction with the molten iron. If molds containing chills are not poured reasonably soon after closing, the chills are likely to condense moisture and become rusty. When this occurs the metal will not lie quietly against the chills and defective castings may be produced.

Numerous slides illustrating the various gating systems and temperature gradients occurring in molds were presented as well as those showing the effects of direct riser pouring, indirect riser pouring and the total and partial reversal methods, step gating, blind risering using the effect of atmospheric pressure, and knife gating. These methods were illustrated to show their effect in controlling solidification.

It was emphasized that a rigging practice file should be maintained by the foundry providing a record of all information necessary for the satisfactory production of castings. It was agreed that pilot castings should be made and their soundness checked before the pattern is placed in production. It is often advisable to take individual castings from a run of production castings and either section or fracture them to determine their soundness.

COST SESSION STUDIES

Various Government Regulations

ROUND-TABLE discussion of government regulations affecting prices and manufacturing costs of castings comprised most of the foundry costs session. R. L. Lee, Grede Foundries Inc., Milwaukee presided at the meeting, with John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill., co-chairman.

Preceding this discussion a report was submitted by C. A. Davis, Caterpillar Tractor Co., chairman, Subcommittee on Revision of Recommendations to Buyers of Castings. This group reviewed for possible revision a paper prepared in 1931 covering recommendations to buyers of castings. Some minor changes were suggested, the most important action taken by the committee being preparation of a suggested form to be used by casting buyers. This form would incorporate all of the pertinent information required by a foundry in quoting on customers' inquiries.

Review of the various Office of Price Administration regulations affecting prices of castings was presented by R. R. Horner, head, Castings Section, Iron and Steel Price Branch, OPA, Washington. Mr. Horner stated that these regulations affect about 1500 gray iron foundries, 250 commercial steel foundries and 80 commercial malleable iron foundries. Despite the government's recent "hold the line" admonition to the country with reference to prices, OPA will continue to act upon appeals from foundries for relief from provisions of applicable regulations which cause inequitable conditions, Mr. Horner stated. He added that exceptions will be granted only where definite evidence of hardship can be demonstrated.

Prices of gray iron castings are frozen at levels prevailing between Aug. 1, 1941 and Feb. 1, 1942. Castings not produced during the freeze period are priced by a formula, and such prices must be filed with OPA on Form 344.2. Steel casting prices are largely on a dollar-and-cents basis.

In discussing cost determination under government contracts, C. S. Roberts, Dodge Steel Co., Philadelphia, recommended that foundries obtain copies of government booklets containing information on this subject. War and Navy departments issue one, entitled "Explanation of Principles for Determining Costs Under Government Contracts," while a similar one published by the Maritime Commission has the title "Regulations Prescribing Methods for Determining Profit." He indicated that government suggestions on cost determination show little variation from recommendations commonly made in the foundry industry.

In subsequent discussion on renegotiation of government contracts it was brought out that adherence to price ceilings should not be regarded as protection against the possibility of adjustment of prices for contracted work. Also it was recommended that foundries study closely the provisions of contracts into which they enter as subcontractors. In some cases such provisions permit the contractor to hold up payment against the completed part of the contract in the event the latter's contract wih a government agency is canceled, and final settlement of the account may require considerable time which would place a financial strain upon a small supplier.

Studies Behavior of Foundry Sands

RECENT progress in sand research was reviewed at one session at which J. B. Caine, metallurgist, Sawbrook Steel Castings Co., Lockland, O., presided, and Dr. H. Ries, Ithaca, N. Y., was vice chairman. "Elevated Temperature Studies of Foundry Cores and Coremaking Materials" was the title of a paper by C. P. Albus, chemist, and Emile Pragoff Jr., technical sales, Hercules Powder Co., Wilmington, Del. Detailing an extensive series of experiments and results obtained from them, this contribution was designed to show how core sands differ in their nature and behavior from molding sands.

The second paper was by Mr. Caine and was on the subject "A Study of 'Burnt-On' or Adhering Sand." This problem is one that has confronted the foundry industry since its inception. Although adhering sand is encountered in all branches of the industry, it is a greater problem in the ferrous foundry than in the nonferrous shop, and particularly in the steel foundry because of the higher pouring temperatures encountered there. Every foundryman has his own theories about this problem, and it seems that no two agree. Often a severe case of adhering sand is responsible for the scrapping of a sound casting.

Mr. Caine's report was divided into two main sections—the first being a study of the mechanism of adhering sand, and the second a quantitative study of the materials present or added to the sand mixes, and their effect on the sintering points and behavior of the mixes when subjected to liquid steel. As all the work was done in a steel foundry, the effect of only molten steel on the various sands was studied. However, a number of nonferrous and iron sands were included in the report, and although conclusions drawn applied directly to steel practice, the fundamentals should apply to all branches of the industry.

It was established by the author that, in steel practice at least, the adhering sand is due to penetration of the metal into the sand, mechanically locking it onto the casting. Adherence due to fusion plays only a minor part, if it enters into the picture at all. Pure mechanical penetration due to too large voids being present in the sand as rammed is the major cause of adhering sand in the steel foundry. Decreasing the void size by decreasing the grain size of the sand decreases penetration and adhering sand in this case, although it decreases the refractoriness of the sand.

Further conclusions are that although penetration of the sand by the metal and subsequent mechanical locking of the sand to the casting is the cause of adhering sand, this action can be caused by fusion and opening up of large voids and

subsequent penetration of the metal into these voids. Mr. Caine discussed the temperature of the metal and sand-metal interface; the action of silica flour, whether added to the sand mix or added as wash; and strong fluxes such as borax. He concluded by saying that the most foolproof method whereby the steel foundryman can decrease adhering sand is to use as fine and as uniform a sand as will give him the other physical properties required. The "B" sintering point should be controlled at about 100 degrees Fahr. lower than the average pouring temperature of the metal.

In a third paper, N. J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O., discussed the use of southern bentonite in the steel foundry. After comparing the properties of western and southern bentonite and describing tests made upon them, he reached the conclusion that the southern product, intelligently used, can be of real help to steel foundrymen in giving (1) definitely higher flowability, (2) easier shake-out, and (3) greater freedom from hot cracks and tears due to sand.

SHOP COURSE CONSIDERS Molding Sand Problems

THE first sand shop course was held Wednesday night. This session was devoted to a discussion of foundry sands for aluminum and magnesium castings and was under the direction of F. S. Brewster, Dow Chemical Co., Midland, Mich. Brief papers by W. F. Rose, Wright Aeronautical Corp., Paterson, N. J.; A. E. Cartwright, Robert Mitchell Co. Ltd., Montreal; M. E. Gantz, American Magnesium Corp., Cleveland; A. V. Lorch, Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J., and Mr. Brewster were presented on various phases of the subject.

The opinion was expressed by several that synthetic molding sands comprised of silica sand and bentonite were preferable for this use, and that the number of mixtures be kept as low as possible. In molding sand the moisture should be maintained at a minimum. Use of synthetic molding sand permits the same base sand to be employed in core production. Application of sand control through use of standard tests aids greatly in holding casting losses from sand defects to a minimum.

One speaker using synthetic heap and facing sands in the production of aluminum and magnesium castings said that the aluminum heap sand had a moisture content of from 4 to 5 per cent, a permeability of 40 to 60, and a shear strength of 3 to 4 pounds. The facing sand moisture was 2.5 to 3 per cent, permeability 30 to 50, and the shear strength from 3 to 3.5 pounds. For magnesium the heap sand had a moisture content from 4 to 5 per cent, a permeability of 80 to 90, and a shear strength of 3 to 3.5 pounds. Magnesium facing sand contained 2.5 to 3 per cent moisture, had 50 to 80 permeability and a shear strength of 3 to 3.5 pounds.

Another used a local bank sand of 90 A.F.A. fineness bonded with bentonite for magnesium castings. Control measures employed with this sand were described. Moisture at the mullers is maintained at 3.9 to 4.3 per cent, and about 0.2 per cent is lost by the time the molder gets the sand. Green compression is maintained at 7.5 to 9 pounds per square inch by varying the bentonite additions and green permeability ranges from 70 to 90. No facing sand is used.

Core sand is made from a local dried bank sand of 60 to 70 fineness to which additions of sandblast sand, zircon, chilled shot, blow sand and patching sand are made as desired to obtain the desired properties. Two main types of cores are jacket with 1 pound per square inch green compression and 180 pounds per square inch baked tensile strength, and a hub of 1.5 pounds per square inch green compression and 150 pounds per square inch baked tensile strength. Moisture content is held at 6 per cent for the jacket sand, 4 per cent for the hub sand, and 2 per cent for the blow sand. In addition to core oil, bentonite and core flour are added to provide green strength.

Second session of the sand control shop course was devoted to discussion of the use of cement in foundry molding. E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit, presided as chairman and conducted discussion.

In a paper, "Use of Cement in Foundry Molding," C. A. Sleicher, foundry superintendent, New England Butt Co., Providence, R. I., explained the principles and reactions in the cement process. Underlying principle, it was explained, is that the sand and cement are subhydrated. In other words, even with excessive water the chemical reaction is never completed. A film of the hydrated cement sets up a wall of protection for the cement which is inside, preventing further chemical reaction.

Although the chemical reaction is rather complex, it was made obvious that when silica sand, cement and water are mixed together and the sand grain is either coated or furnished just enough cement for contact of grains, the result eventually is a hard mass obtained by various degrees of hydration. First the initial hydration takes place due primarily to evaporation and enough temperature, about 70 degrees Fahr., to cause hydration. Above this temperature, evaporation may hinder hydration, and, below it, especially down to 40 degrees, hydration stops. The principle is that proper temperature is needed for a chemical reaction.

Mr. Sleicher cited lower material costs as one of the more important reasons for the value of cement in molding. The big saving comes in the reuse of the cement bonded sand, the chunks generally being ground in a mill and used over again. Cement can be used anywhere where the iron shrinks away from the mold or core, and is capable of effecting an increase in production. The author also claimed higher quality and denser castings are produced.

Final sand shop course was held Friday night with discussion leaders H. W. Meyer, General Steel Castings Corp., Granite City, Ill., and Robert H. Jacoby, Key Co., East St. Louis, Ill., who spoke on various phases of sand practices employed in their respective foundries. They also described the methods of sand control followed, and the types of sand testing equipment used.

Considers Foundry Refractories

FOUNDRY refractories were reviewed and discussed at a session held Friday afternoon with C. E. Bales, Ironton Firebrick Co., Ironton, O., as chairman, and L. C. Hewitt, Laclede-Christy Clay Products Co., St. Louis, as co-chairman. The session was opened by Mr. Bales who read a paper on the "Conservation of Foundry Refractories", which had been prepared jointly by the speaker and Francis McCarthy. This paper was presented in the May issue of THE FOUNDRY, starting on page 95.

Second speaker of the session was E. K. Pryor, Charles Taylor & Sons, Cincinnati, whose paper covered, "Direct Arc Electric Furnace Refractories". Mr. Pryor pointed out that selection of a refractory is at best a compromise and then followed with a description of the various refractories which are in use by producers of direct arc electric furnace castings. He listed their advantages and disadvantages, and the applications for which they are best suited. The speaker emphasized that high production schedules are particularly destructive to refractories. Operators can determine by observation which phases of production are most harmful to refractories and by adjusting practices accordingly, can do much to prolong refractory life.

In the discussion which followed presentation of the paper, John McBroom, Hydro-Arc Furnace Corp., stated that many troubles were blamed on refractories that proper furnace control would eliminate. He recommended as a means of prolonging refractory life that when a melt has been completed and is being held in the furnace for some reason or

(*Continued on page* 128)

Sly Dust Filter, exhausting blast room in large foundry.

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other, that the operator reduce the voltage as well as shorten the arc by the use of the lowest tap on the transformer, which Mr. McBroom felt was seldom used by most operators.

The session was concluded with the presentation of a paper by M. H. Berns, Electro Refractories & Alloys Corp., Buffalo, which was entitled, "Refractories in the Nonferrous Foundries Under War Conditions". Mr. Berns pointed out that in the selection of the proper refractory for a specific application, three points must be kept in mind: Service conditions imposed on the refractory; properties which the refractory has to withstand those conditions; and whether the selected refractory is economical as compared to some of the others. The speaker pointed out that no one is in a better position to evaluate and control service conditions than the foundryman himself. Properties of available refractories are flexible and they may be changed to give preferential maxima to one property at the expense of one or more others. Regarding the point on economy, actual service alone can determine whether any one refractory is more economical than another.

Service conditions which affect refractories were listed as: Working temperature, temperature variation, metal, slag, furnace atmosphere and movement of the metal, slag or furnace gases with respect to the refractory.

REVIEWS MATERIAL FOR Cupola Handbook

CUPOLA slags and fluxes were discussed extensively by George S. Evans, Mathieson Alkali Works, New York at gray iron shop course held Wednesday evening with Kenneth Priestley, Eaton Mfg. Co., Vassar, Mich., as chairman and Dr. E. E. Marbaker, Mellon Institute, Pittsburgh, as vice chairman. In introducing the speaker Dr. Marbaker stated that the formal paper to be presented by the speaker in more or less abstract and commentary style, was the material compiled by sub-committee III on the cupola research project sponsored by the American Foundrymen's Association, and eventually would form the chapter on the subject in the forthcoming *Cupola Handbook*.

After outlining the various operating conditions and the materials responsible for the production of slag in the cupola, the speaker stated that about 50 pounds of limestone are needed per ton of iron charged, or 20 per cent the weight of the coke charge, where the melting rate is 1 pound of coke to 8 pounds of iron. Usually, and especially on long heats, it is advisable to commence using limestone on the bed to produce a good volume of fluid slag. He stated that soda ash melts well above the melting zone and therefore will liquefy a gummy slag more rapidly than either limestone of fluorspar.

The amount depends on many variable factors. For example with 100 per cent steel scrap charges for the converter, the weight of stone on the regular coke charges may be reduced to 10 pounds of limestone and 4 pounds fused soda ash per ton of metal. Topics included fluxing agents, specifications, fluxing reactions, computing the flux charge, cupola slags, acid vs. basic slags, effect of fluxes on cupola lining, and charts showing (a) Effect of temperature on rate of calcination and (b) Time required for complete calcination.

Carbon control of cupola cast iron was the topic for the second gray iron shop course, at which session P. T. Bancroft, Republic Coal & Coke Co., Moline, Ill., presided, and Dr. E. E. Marbaker, was vice chairman.

H. Kenneth Briggs, sales metallurgist, Miller & Co., Chicago, led the discussion after presenting a paper on the subject of carbon control, this paper being a contribution to the work of the A.F.A. Cupola Research Subcommittee on Cupola Operations of which he is chairman. The author pointed out that carbon control of cupola cast iron is but a single subject of the chapter on cupola operation that will appear in the *Cupola Handbook*.

The subject has to do with the manipulation of the cupola for securing more or less carbon in the molten iron. Since applications of various irons were referred to in the paper, the author presented the review with the thought that the material will be criticized and revised later by the committee. The well-known formula of "effective carbon" was offered to correlate the influence of carbon, silicon and metal section. Chill and fluidity tests were discussed in their relation to cupola control and chemical analysis, for four ranges of total carbon and silicon.

Mr. Briggs admitted that his presentation contained little that was new, rather it was but the careful enumeration of rules for making good iron. After the first edition of the Handbook is published, funds available will be used for studying better techniques and results will be published from time to time. Calling attention to the fact that several A.F.A. papers cover the configuration of graphite in cast iron and its control, Mr. Briggs asserted that subject is almost as important as the subject of his paper. Likewise, heat treatment of cast iron is receiving much timely attention. In conclusion, he said it may well be that the next major advance in the industry will be in these two directions.

In the discussion, Gottfrid Olson, foundry engineer, National Foundry Association, Chicago, suggested that publications of the Handbook at this time might be premature and suggested further study of certain phases of cupola operation. Mr. Briggs countered that progress likely would come more rapidly by getting the book in print and perfect it in subsequent editions, a position in which others seemed to concur.

A paper, "Design of a Front Slagging Cupola Spout," by R. D. Petcher, foundry superintendent, manufacturing division, Weil-McLain Co., Michigan City, Ind., was presented by title only.

Concluding session of the gray iron shop control course Friday evening had H. H. Wilder, industrial specialist of the Castings and Forgings Section, Steel Division, WPB, Washington as chairman, Dr. E. E. Marbaker, discussed the various materials which are to be included in the A.F.A. *Cupola Handbook*. Early chapters of the book, treating chemical reactions, thermal balance and other fundamental relations in the cupola, were discussed briefly by Dr. Marbaker. The section recommending proper selection of refractories is yet to be completed.

Methods of Blowing Cores Described

ON WEDNESDAY afternoon, under the chairmanship of Vaughan Reid, City Pattern Works, Detroit, M. J. Gregory, foundry division manager, Caterpillar Tractor Co., Peoria, Ill., presented a paper prepared by Z. Madacey of the same company on "Core Blowing As a Factor in a Semiproduction Foundry." The author discussed methods of core blowing and related factors as applied to a wide range of castings. Factors include accurate sand control, skilled help and co-operation between various departments.

At various points during the presentation of the paper and the slides by which it was illustrated, the speaker departed from the text to introduce explanatory and supplementary comment. In the question period which followed the formal presentation the speaker went into further detail on corebox construction, short cut methods, sand mixtures, air pressure and type of vents. Of the many management factors involved the most important is co-operation. Every department is involved to some extent. Molding departments, pattern shop and cleaning room can contribute in simplifying and making core blowing more economical. Gating, in some cases can be changed, patterns can be turned over. In some instances it is advisable to ignore impressions left by wire and rod stools. The little knobs of iron readily can be removed in the cleaning room. It is impossible to lay down hard and fast rules.

The amount of air pressure available will determine the number of vents, blow

(*Continued on page* 131)

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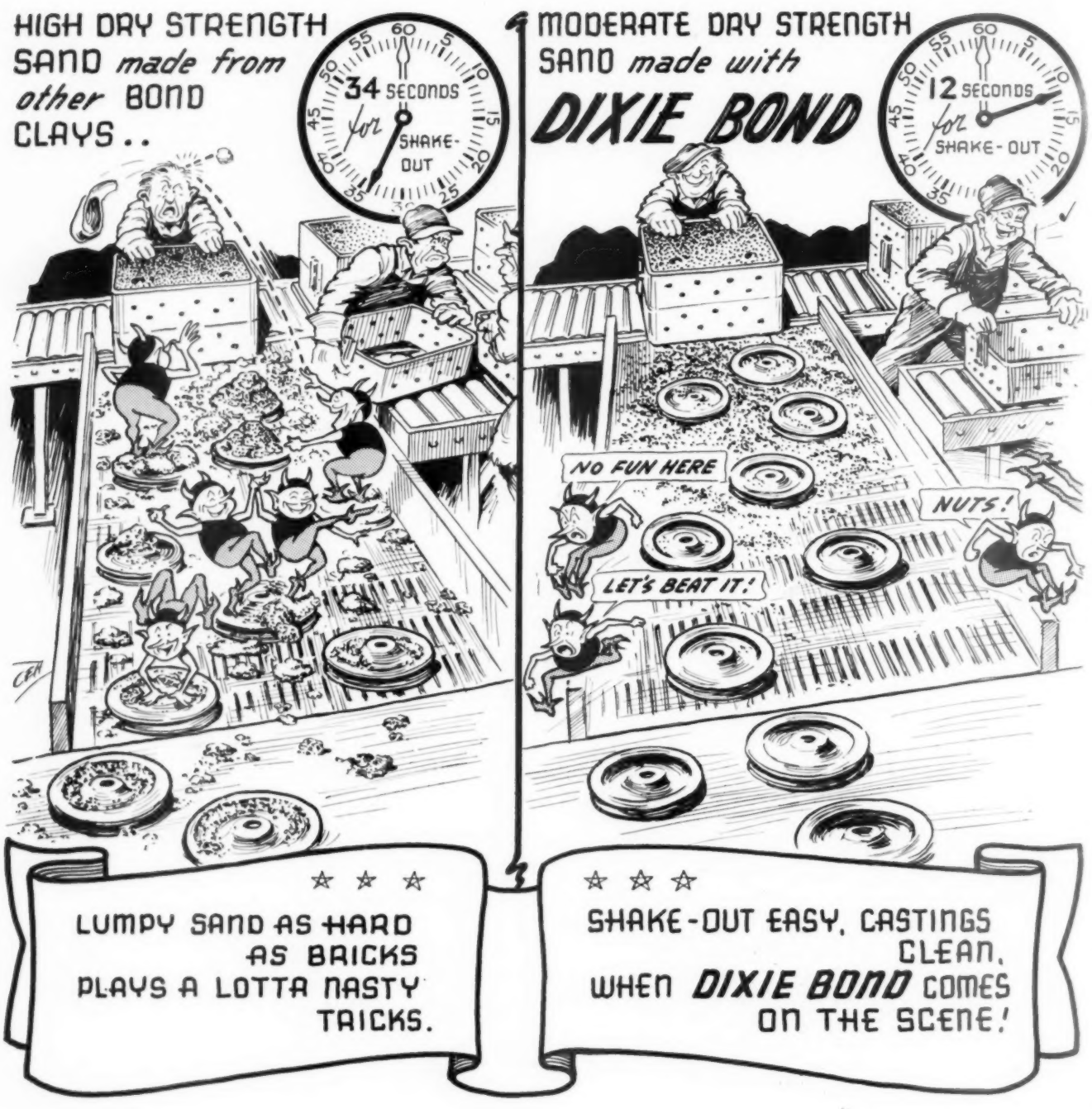
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(*Concluded from page* 128)

holes and their sizes. Sand drying facilities to some extent may be a factor. Experience indicates that although there are certain basic fundamentals or principles, the supervisor should possess and exercise good imagination and ingenuity. In the majority of instances each corebox or set of coreboxes presents an individual problem.

Touching on the life of a corebox in use on a core blowing machine the speaker instanced a set of coreboxes for a diesel cylinder head. These boxes were used for 2 years on an air jolt hand roll-over machine. Then they were rigged for use on a core blower. They have now been in use for years and produced approximately 100,000 pieces and are still in good condition. This paper is being reproduced in THE FOUNDRY in two sections. The second installment starts on page 86 of this issue.

In the second part of this session under the chairmanship of M. J. Gregory, a paper entitled "Heavy Gray Iron War Castings Produced by Modern Controlled Methods," was presented by Samuel Appelby, foundry superintendent Buffalo Foundry & Machine Co., Buffalo. The speaker described the application of modern controlled methods and outlined some of the important changes developed in recent years to replace former hazardous, rule of thumb operations. He stated that most of these developments have been accepted and successfully applied by many foundries producing light and medium weight castings made in green sand, skin dried and dry sand molds. These same methods now are applied in the production of heavy gray iron castings weighing up to 125 tons in dry sand and loam molds. Standardization and effective control of materials, engineering and planning to determine method of procedure and proper coordination of all operations are essential factors. A number of illustrations showed typical heavy castings.

DISCUSS DRYING CORES

And Reclaiming Sand

PLANT and plant equipment session Friday afternoon, presided over by James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind., was devoted to discussion of core and mold drying equipment and core sand reclamation.

Excerpts from a paper on "Infra Red Lamps Dry Green Sand Molds", were read by Mr. Thomson in the absence of its author, L. M. Duryee, Connecticut Light & Power Co., Waterbury, Conn. This paper covers an installation at the Krodel Foundry, Waterbury, where radiant heat lamps are employed. in drying green sand molds for bronze castings. An article by the same author describing this installation appeared in the April, 1942 issue of THE FOUNDRY. Time for drying each mold averages 90 minutes, giving uniform penetration of dryness to a depth of 1½ inches in the mold surface. Labor of three men, formerly using torches and charcoal for drying the molds, has been eliminated.

E. H. Robinson, Nela Park Engineering department, General Electric Co., Cleveland, demonstrated various types of lamps available for mold and core drying and described their development. He pointed out that such lamps also might be used advantageously to supplement other drying processes, particularly in the case of large molds having sections or pockets which are inaccessible and difficult to dry by other methods.

Equipment for reclaiming used core knockout sand by exposure to temperatures above 1000 degrees Fahr. was described by W. L. Hartley, Link-Belt Co., Chicago. Granulated sand is fed into a rotary kiln, where carbonaceous and other foreign matter is burned out or evaporated in a temperature of 1000 to 1500 degrees Fahr. From the exit end of the kiln the sand drops into a rotating cooler, through which cool air is blown, emerging from the opposite end into a settling chamber and from there through a vibrating screen. Units are available in capacities of 1 to 10 tons per hour, with operating costs varying according to size of installation. Total cost for a 3-ton unit was given at $1.44 per ton of reclaimed sand.

Physical properties of core sand reclaimed by this process by Wright Aeronautical Corp., Cincinnati, show little difference from those of new sand, according to O. Jay Myers of that company. However, percentage of fines is higher in the reclaimed sand, he reported. New sand containing 4.72 per cent fines increased to 13.74 per cent after reclaiming. Silica content was essentially the same for new and reclaimed, while iron and aluminum oxide percentages were higher for the reclaimed sand.

Tests of the new sand and reclaimed sand, respectively, were reported as having the following properties. Tensile strength, 164 and 133 pounds per square inch; hardness, 65 and 65; dry permeability, 100 and 84; green permeability, 92 and 68; green compression strength, 0.65 and 0.75; grain fineness, 70 and 84.

A check-sheet of recommended procedures in the supervisory field which management is urged to follow in order to build sound management-supervisory relations, has been issued by the National Association of Manufacturers. The procedures are outlined in a 16-page pamphlet entitled "The Foreman, the Key Man in Your Plant".

UNITED STATES HAS 1802 FOUNDRIES

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ber of plant additions and in the modernization of many gray iron foundries, so that the total gray iron foundry capacity at the present time is considerably in excess of that available when the war clouds were beginning to gather. The decrease in the number of malleable iron foundries is represented entirely in small shops, or in foundries which have discontinued entirely the production of malleable iron but continue to produce other types of castings.

The total number of steel foundries jumped from 298 in 1941 to 334 in 1943. However, the real story in the steel foundry industry is not revealed in these statistics, but rather in the increase in the capacity for producing steel castings. Since the start of the present emergency, the capacity of the steel foundry industry in the United States has been more than doubled, with several large plants not as yet completed.

The number of exclusive nonferrous foundries increased from 1446 in 1941 to 1506 at the present time. On the other hand the number of nonferrous departments of other foundries decreased from 1354 to 1114 in 1943. This brings the total of nonferrous foundries in 1943 to 2620, as compared with 2800 two years ago. A rather surprising trend in the nonferrous field is the decline in aluminum foundries from 2174 to 1911 for 1943. Here again the most of this reduction involves small shops, and it is believed the total capacity for the production of aluminum castings has increased considerably during the past two years. The total number of magnesium foundries, according to the list, is 129 for 1943. These plants were not segregated in the previous edition.

Increased in Canada

It is rather interesting to note that in Canada, the total number of gray iron foundries, malleable iron foundries and steel foundries increased. While the number of exclusive nonferrous increased from 86 to 99, the number of nonferrous departments decreased sufficiently to record a decline in the total number of nonferrous foundries in Canada.

Chicago again occupies first place with a total of 159 foundries. The standing of other leading foundry centers is as follows: 2-Los Angeles, 133; 3-New York, 116; 4-Cleveland, 106; 5-Detroit, 92; 6-Milwaukee, 69; 7-Philadelphia, 67; 8-Boston, 56; 9-Toronto, 55; 10-St. Louis, 51; 11-Cincinnati, 51. Minneapolis and St. Paul combined boast of 60 foundries.

National Foundry Sand Co., Detroit, has been appointed sales agent of the Titanium Alloy Mfg. Co., New York, for the sale of Tam Zirconites in the state of Michigan.

the adventures of BILL

BY PAT DWYER

Drawings By RICHEY

"PON my word," said Bill the other night after we had listened in pained silence to an unreasonable facsimile of a singer on the radio, "some curious yowlers are creeping out of the woodwork recently. If that bird is a singer, then I am a howling ring tailed monkey from the deep untrodden jungle of the Amazon or the Orinoco or wherever it is these sprightly little characters hang by their tails and yell all night at the top of their voices."

"Am I to understand," I inquired politely, "that you do not regard the recent offering with favor?"

"Favor sez he. Listen, I have heard better static coming out of that very same radio, especially on stormy nights. For practically any job you care to mention a man or woman has to have certain qualifications and in many cases has to go through a pretty stiff examination. Apparently all a man needs to get a spot on the radio is a moaning voice capable at times of hitting the entire range of notes from *E* below to *C* or in extreme instances *D* on the treble cleff, from *Do* to *La*, just imagine, almost an entire octave. The part that burns me up is that these birds get time and space on a program, while so many lads who really can sing are left, as the feller says, to waste their sweetness on the desert air. As far back as I can remember no gathering of men lacked one or more members who could sing like the blinkin' birds on the trees. The best high lyric tenor rendering of the *Angel's Serenade* I ever heard was that of one of Farrel's apprentices at a molder's smoker in the old Germania Hall in Ansonia about 1900."

"That was the night," I said, "that Pittsburgh Pete brought down the house with *Never Take the Horse Shoe From the Door*, with Bob Saunders doing a spirited imitation of a tap dance accompaniment with two beer mugs on the table top."

"Ah," Bill sighed. "Them wuz the days. Le's see. How did she go: There's a story handed down in Irish hist-o-ree, far back beyant the days of Brian Bo-roo, that the best of luck will surely wait upon you, if you find upon the road a horse's shoe. Then gather the childther round me Sunday mo-or-ning. Let the baby rowl upon the flo-o-ore. I give yez one an' all a timely wa-ar-ning, never take the horse shoe from the do-o-ore!

"By the way," he continued, "that reminds me of a recent communication I had from my old friend Bob Hopkins down in Alliance. Bob owns and runs a brass shop, but his true avocation is writing clever and scholarly monographs on a great variety of subjects. His latest deals with the life and times of a famous Biblical character and by a curious coincidence the opening line follows the pattern laid down in the old come-all-ye. Bro. Hopkins takes his trusty pen in hand with the following result:"

There is a story handed down in Jewish history, back in the days of Shophetim, which closely parallels the earlier adventures of the New Deal and its long haired proponents, now happily shorn of strength and vote baiting influence. An able youth by the name of Samson assumed the title of Judge, but from the record he seems to have devoted more time and energy to judging certain females of Philistia than he did to ruling his own people and dispensing justice.

Judges in those days were neither elected nor appointed by the people. They seemed to preempt or hijack the office and were suffered to serve during life time, in spite of behavior. This here now Samson was a kind of sprite of the hill billy variety, getting his people into more trouble and adversity than he was able to settle.

The first indication of judicial incapacity and incompetence was his selection of a Philistine damsel in preference to the fair ones of his own race. This incident ended up with a riddle and a bet with thirty young men. He paid the bet with thirty suits of clothing feloniously pinched, lifted, snagged or otherwise appropriated from thirty stout lads whom he had transplanted in the New Jerusalem without proper trial, by your leave or due process of law. The final result of this enterprise was the hasty retreat of brave Samson to the tall timbers of Zorah, while his affinity and her household were burned and utterly destroyed.

Their taste has not been cultivated

In quest of further adventure, Samson turned to the chase of a lower order of the animal kingdom (Note by Ed: What do you mean, lower?) and thereby established a record for lone hand, live fox catching which never has been surpassed by all hunters, trappers and chasers of history. Samson caught 300 foxes, paired them off, tied their tails together and fastened a fire brand to each pair of tails. Then he set the foxes racing at random and in a blaze of glory through the Philistine corn fields and vineyards. A certain party (Name on request) tried the same tactics in Europe in recent years. Kind of back fired on him.

For quick results, neatness and planned economy, that fox chase beat all the hog killing, and crop plowing under ever devised by the late unlamented, defunct and discredited brain trust. Strange to say, the Philistines cursed and condemned that noble experiment as earnestly and whole heartedly as did the American farmer over the lethal treatment of hogs and wanton destruction of crops.

Strong men who love the ladies and fear no evil, are not easily yoked up or tied down. They crave with a mighty craving for new fields of endeavor, for the opportunity of robust, virile, personal service. As the hart pants for the flowing stream, these bimbos pant for deeds of derring-do and high adventure. Samson again took up the chase and successfully stormed the citadel of love in the town of Gaza where a Philistine beauty of more or less shop worn virtue furnished the personal magnetism. To quote from a poet of the period 'A maid of Philistia fair and alert, much had she risked out but never got hurt' (Note by Ed: Some poet).

Note by author: Some Editor!

Now it came to pass in those days that the Gazites, or Gazaboos or whatever, had Samson's pedigree and social security number, also a record of his numerous, amorous and warlike adventures, all down in black and white in the town hall archives. He came to town once too often. The elders and the town fathers and the chamber of com-

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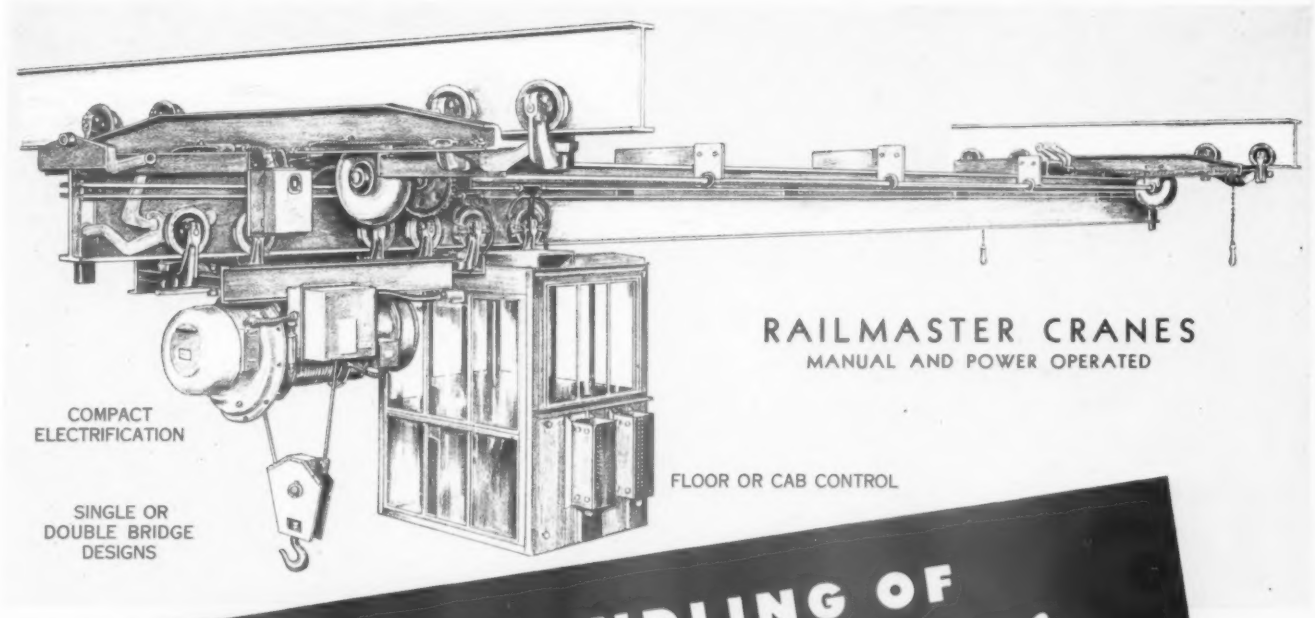

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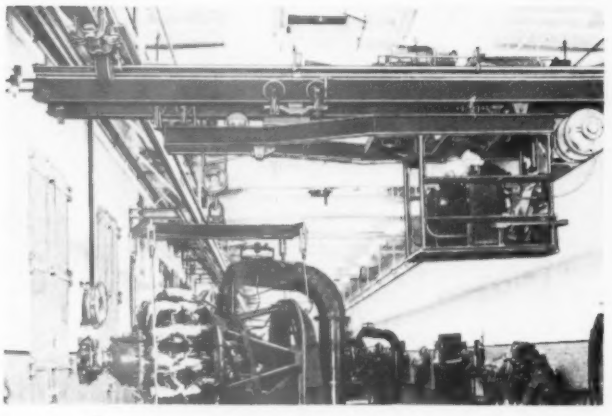

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(*Concluded from page* 132)

merce planned a little intimate ceremony in which the laying on of hands played a prominent part. They locked the city gates to prevent our hero from hitting the trail to the tall timber. At or about the hour of midnight when he fared forth to give leg bail for his old stamping ground in the land of Zorah, he was pained, astonished and more than a little peeved to find the gates locked and the way barred. Antedating Superman or Tarzan by many centuries he put the old strength and muscle to work and opened the way. The great gate, posts and all were carried on his shoulders to the hill of Hebron and he was safe from danger and pursuit. Once again he had earned the inalienable right to life, liberty and pursuit of his particular brand of happiness.

Brethern, let us pause, meditate and consider whether a modern Samson may not have carried away the great constitutional gates which heretofore have guaranteed, secured and protected our liberties and freedom of action.

History of the human race is replete with instances to prove without shadow of reasonable doubt that a great lover can be a valiant and resourceful warrior, skilled in all the nice technical details of his chosen calling, as brave and invincible on the field of battle as in another less violent field presided over by the little guy with the bow and arrow.

Doubly blessed in this wise was the merry and marauding Judge of Israel when on one occasion he stood his ground alone and for some time unarmed against a regiment of infantry. (Note by Ed: Technical error. They should have called out the Marines).

Further note by author: Who is running this campaign?

Quick of perception and nimble in action Samson found him an implement of war, a weapon hallowed by time and dearly beloved of practical amateur and professional politicians, the jaw bone of an ass. Thus fully armed and munitioned he laid about him right lustily with force and vigor and presumably with great pleasure, fore stroke and back stroke, lunge and parry.

Lo and behold, when he finally laid down the club, tallied his score card, paid his caddy and retired to his shower in the locker room, the pulverized bodies of 1000—count 'em—1000 Philistine warriors lay stark and stiff on the field while their spirits presumably and charitably were on the way to the beautiful isle of somewhere. No record exists to show that he ever expressed the slightest regret for this bit of a purge or even contributed a penny to the burial expense. Probably cocked his hat over one eye and went on his way merrily whistling the original version of *The Flowers of the Forest Are Faded Away.*

Low-minded fellows who scoff at everything outside their own little pitiful circle of knowledge based almost entirely on what they read in the press, that great bulwark of our civilization, and source of most of our misinformation, will question the assumption that our hero walked away whistling. 'Tis true, the story as we have it does not specifically state that Samson cocked his lip and poured forth a roundelay ornamented with a flock of grace notes, trills and runs like those of a bird in a gilded cage, but what of it? Let them ponder for a moment on the old conundrum 'Why can a tin whistle? Answer: Because a tin can!'

After nearly two score years (Twenty to you) of free and easy judicial function, skulduggery and general malfeasance of office, a great part of the time under statutory indictment, Samson laid the foundation for the final pitiful and tragic phase of his high riding, free, wide and handsome career. A lady named Delilah, with quite some reputation, as reputations go in the valley of Sorek, by devious feminine wiles, charms and enchantments, deprived the honorable Court of all reason, common sense and sound discretion. The Samsonian secret was exposed by amorous seduction. A mighty man was sheared and shorn, reduced to slavery and the sight of his bold, bright eyes destroyed forever. The crime of mayhem practiced by the mob frenzied Philistines is reflected today by Hitler the Hangman, Mussolini the Dope and Hirohito of unknown, but apparently of canine ancestry.

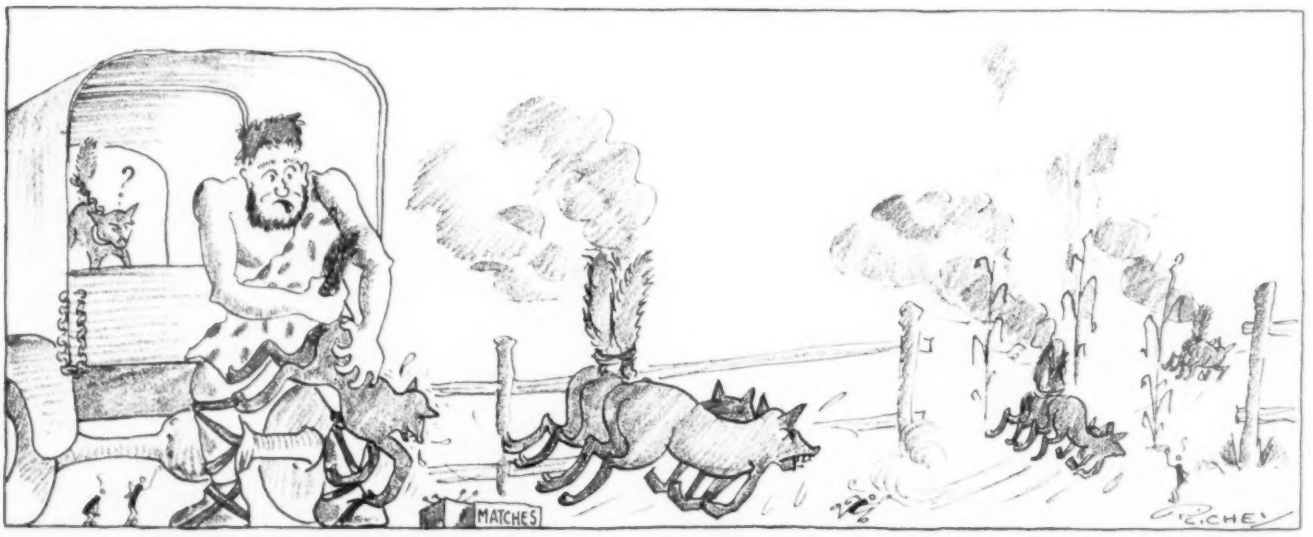
Heeding neither law nor restraint of equity, the mighty dictator Samson was driven like an ox in grinding corn for the victorious enemy. Straining at the mill sweep within the prison walls the shorn man could meditate and perchance pray pardon for a broken vow and a misspent life. Meanwhile the Philistines assembled a great company to offer sacrifice and to exult in the victory over the man who had mowed down their people as the reaper lays down the standing grain. The great building was filled with men, women and children. Three thousand more were on the roof. In fancied security they rejoiced and made merry. A little innocent diversion did not often come in their drab lives.

The time was at hand for the climax. The mob wanted to behold the defeated champion and to have him make sport. Ah! Little did they reckon with the hair that had not stopped growing while the mighty one languished in prison. A lad was sent to lead Samson before the joyful company waiting for entertainment. The blind giant courteously asked the boy to kindly lead him between the main pillars supporting the roof. He wished to lean upon them.

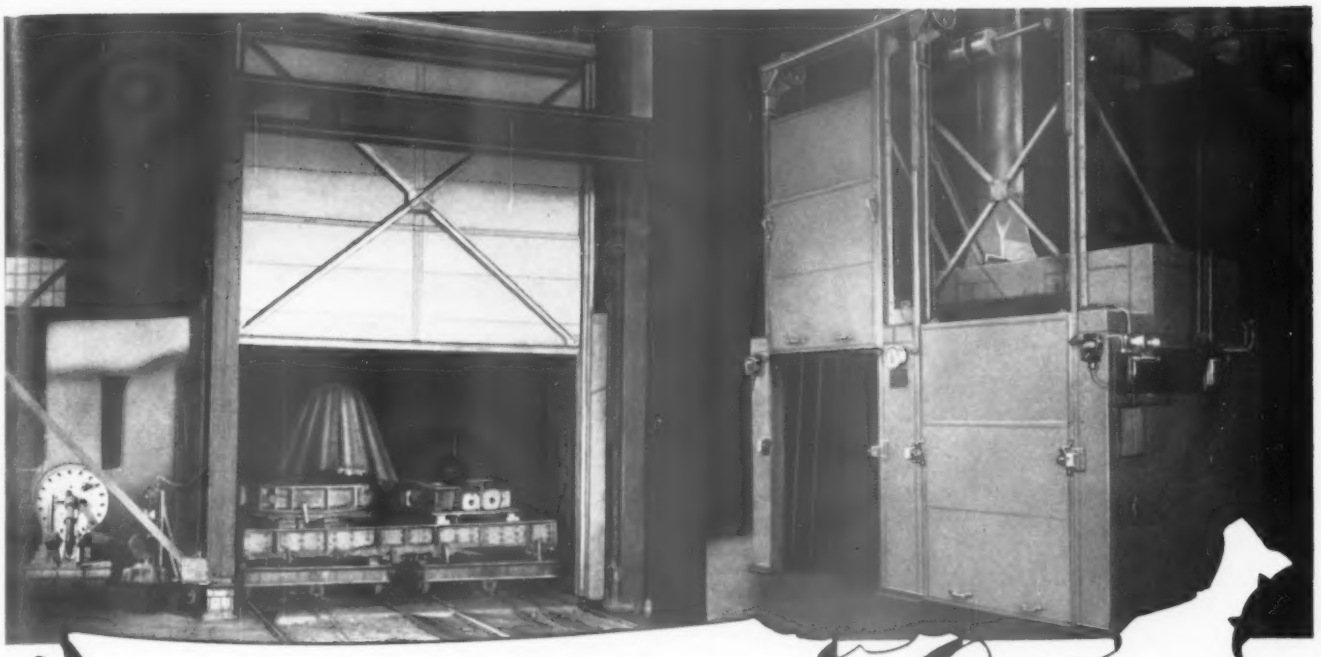
There and then a prayer was formulated out of the depths of his heart, out of all the intense suffering, humiliation and wounded pride. A prayer for strength. An agonized prayer calling for vengeance and reprisal. Resigned to self sacrifice his mighty arms encircled the two pillars. He heaved with all his mighty and in this instance, superhuman strength. The columns buckled. The house and roof collapsed. He slew more enemies in his death than he had during his life time. Samson the dictator paid the price.

Verily, dear brethern, the dictators of all ages and of all nations come to the end of their resources, discredited, scorned, hated and in the main, tragic in their ending. The law of compensation provides no appeal from judgment, change of venue or stay of execution. Judgment therefore is preemptory and absolute. Verily, he that goeth forth to shear, shall return shorn. Let us arise and sing *O Happy Day.*

"Amen," said Bill. "And remember, never take the horse shoe from the door"



Samson, the greatest strong man of all time, stages his most famous act under the title The Commandos Take Off At Dawn



A BETTER WAY TO HELP THE WAR EFFORT

Today it is not enough just to build or operate average production core ovens. If the foundry fulfills its complete obligation in this national emergency, it must produce its full quota of good castings as economically as possible. That requires core ovens that will turn out perfect cores quickly using a minimum amount of fuel.

Statements from foundrymen through the nation indicate that Young Brothers ovens will make important savings in both time and fuel while producing first-quality cores. And these ovens are just as effective for mixed loads of large and small cores as they are for cores of uniform size. The Government is using Young Brothers ovens here, on the seas, and overseas. Send for Bulletin 2-C and ask for the address of the Young Brothers local representative.

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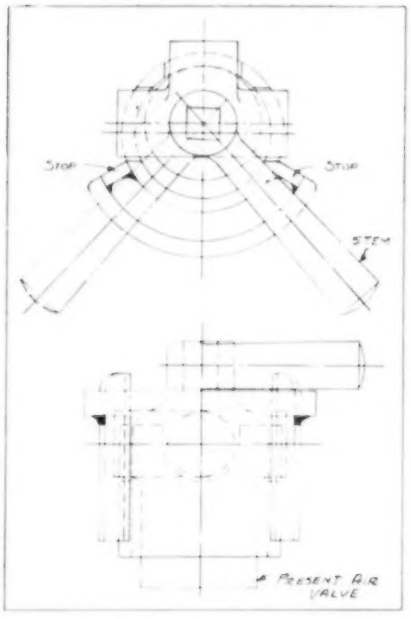
FOUNDRY DEVELOPMENTS
At short range

ONE of the peculiarities of magnesium melting is that to secure a fine grain structure with resulting good physical properties, it is desirable to superheat the metal after it has reached the molten state. According to "Magnesium Scrap Book", published by the Fisher Furnace Co., magnesium alloys melt at about 1200 degrees Fahr., and superheating consists in raising the temperature to around 1650 degrees and holding for 20 minutes before the metal is cooled back to pouring temperatures of 1260 to 1440 degrees. That cycle largely determines the number and type of furnaces required.

♦ ♦ ♦

Stewart Simpson, American Hammered Piston Ring Division, Koppers Co., Baltimore, Md., was awarded a Certificate of Individual Production Merit



by the War Production Drive Headquarters, WPB, Washington, for his improvement of the air valves on molding machines. As originally designed the 3-way air valve was keyed to and supported by the head of a ½-inch valve stem. After a few weeks of constant service the valve stem head would become worn to such an extent that lost motion in the handle would prevent proper functioning, and the machine would have to be taken out of service pending installation of a new valve. Improvement consisted of slipping a piece of pipe over the body of the valve and welding thereon a support equipped with stops which provided additional support with positive stops for the valve handle, as shown in the accompanying illustration. The device has been applied to 35 machines, and has practically eliminated expense and lost production incident to frequent renewal of the old type valve.

♦ ♦ ♦

In a recent patent it was pointed out that hot quenching of steel containing 0.78 per cent carbon, 0.58 per cent manganese and 0.146 per cent silicon in a tempering bath maintained at 1112 degrees Fahr. until the structure is composed of 75 per cent bainite and 25 per cent tempered martensite only requires about one-third the time for producing 100 per cent bainite, and the properties of impact, bend and hardness are approximately similar except tensile strength which is higher.

♦ ♦ ♦

A GOOD guide for determining the proper size of coke split in the cupola is to check up on the melting rate. A figure sometimes quoted for normal or average conditions is 20 pounds of iron per minute per square foot of cupola area at the melting zone which equals 1200 pounds or 0.6 tons per hour. That figure is much too low, and the ideal to be aimed at should be at least 28 pounds, equal to 1680 pounds or 0.84 tons per hour per square foot of cupola area. In actual practice a melting rate midway between those figures may be considered fairly satisfactory for small heats, but under the best conditions, the higher figure of 0.84 tons per hour may be exceeded.

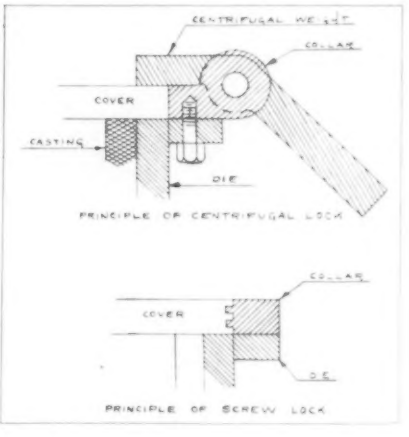
♦ ♦ ♦

It is claimed that the advantages which hard chromium give to steel are now possible for aluminum by a simple method consisting of a preparatory dip into an alkaline solution for about a minute at room temperature. Plating thicknesses up to 0.050-inch have been made without hydrogen embrittlement, crazing, lifting, etc. Process is said to be applicable to cast, wrought and forged aluminum and its alloys. Adhesion tests of plating to aluminum show at least 16,000 pounds per square inch. Heating specimens up to 1000 degrees Fahr. and plunging into ice cold water or calcium chloride at a temperature of —50 degrees Fahr. does not separate or lift plating.

RECENTLY developed magnesium base alloy which according to the patent description is claimed to possess excellent yield and tensile strengths, and good formability (ductility) contains from 3 to 12 per cent thallium and 0.1 to 0.3 per cent cerium. The cerium is added in the form of misch metal which contains in addition to cerium, lanathum and other rare earths. While the alloy is designed primarily for rolling into sheets and other forms, it is said that it may be employed for castings and forgings.

♦ ♦ ♦

James G. Weber, Ampco Metal Inc., Milwaukee, was awarded a Letter of Honorable Mention by the War Production Drive Headquarters, WPB, Washington, for designing a fly-ball cover-clamping device for centrifugal casting machines. The old method was to use a screw lock device requiring considerable effort to open and close hot dies or

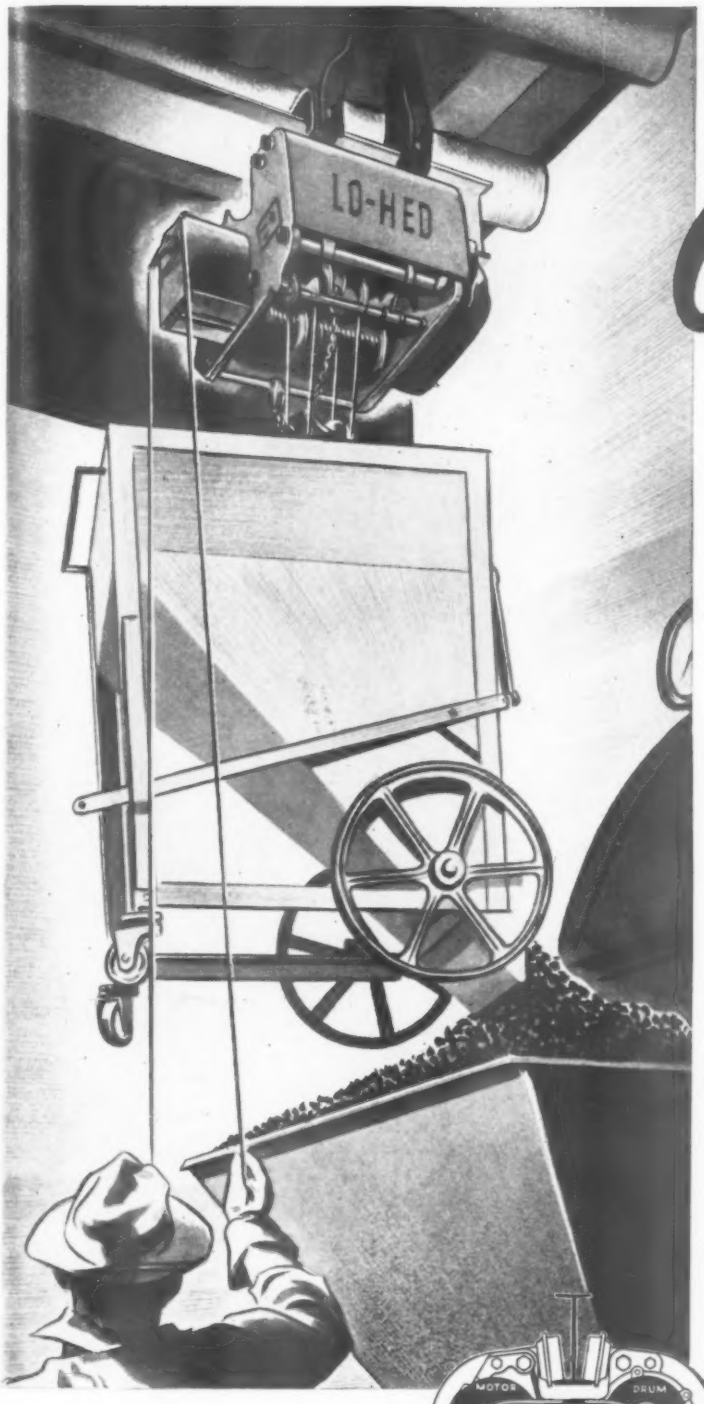


molds. With the present design the centrifugal weight drops when the die is not rotating, leaving the cover free, and when the die rotates at high speed, centrifugal force causes the weight to clamp and shut the cover tightly. The new clamping device results in a saving in production of about 40 per cent of the total centrifugal tonnage, and increased production a minimum 80 per cent of all castings. The new design also releases two men and, due to fatigue reduction, permits employment of women as operators.

♦ ♦ ♦

To provide a metal mold for centrifugal casting which has high venting qualities a patent describes the use of porous powdered metal, sponge iron, or iron

(*Concluded on page* 138)



ONE MAN DOES WORK OF 2

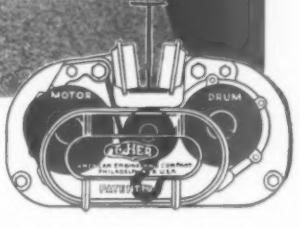
When he gets a lift with a LO-HED HOIST

Here's a good example of what a Lo-Hed Hoist and American ingenuity will do to ease a man-power problem. In this boiler room you'll find no messy coal pile on the floor, no man shoveling all day into the stoker hopper. Coal is wheeled into the boiler room in a tidy little cart, lifted by a Lo-Hed and dumped into the stoker hopper. Lo-Hed does the brute work, frees the engineer for other necessary boiler room duties and maintenance jobs. If this illustration gives you an idea, write or telegraph for full information about a Lo-Hed Hoist suitable for your requirements.

LO-HED IS THE "BALANCED" HOIST FOR HEAVY DUTY SERVICE

The *balanced* arrangement of motor and drum in a Lo-Hed Hoist allows the hook to be pulled up until it almost touches the beam—a desirable plus feature for which you pay no premium. This same arrangement makes possible the use of an all spur gear drive from motor to drum.

Other important features of the Lo-Hed Hoist are the heavy duty hoist motor; strong, short shafts; high duty bearings; 100% positive automatic stop; and removable protective covers for all vital parts.



The Lo-Hed Hoist can be adapted for operation on any monorail system. There's a Balanced Lo-Hed Electric Hoist for Every Purpose.

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(*Concluded from page* 136)

chips bonded to form the outer mold while the interior is coated with refractory granules which are held in place by centrifugal force although the layer next to the metal portion may be bonded.

♦ ♦ ♦

Sometimes it is found practical to spray or swab green cores with a coating, bake them and when they have been removed from the oven to brush on a second coat after the cores have cooled below 195 degrees Fahr. Residual heat in the core will dry the second coat. However, do not coat cores that are hotter than 195 degrees because the coating will boil, and a rough surface will be formed.

E. B.

Occupational Rating

Occupational Rating Simplified for Foundries is the title of a brochure in a loose leaf ring binder issued by the National Founders Association, 120 South La Salle Street, Chicago, to offer a plan by which an equitable wage structure may be built. Details are clearly set forth and summarized in the "Occupational Rating Schedule" which makes it unnecessary to go through a maze of figures. The plan is not offered as a fixed method to be accepted regardless of the present setup, but rather as a guide to those who feel that some system would be helpful. Credit given under the merit rating plan is figured in percentage of the base rate and is arrived at by rating the individual on five points: Quality of work, quantity of work, personal habits, co-operation, carrying out instructions. Each of these qualities is rated as excellent, good, fair or poor.

Using Equipment Parts You

FORMERLY THREW AWAY

By E. W. ZICK
Maintenance Engineer
General Malleable Corp.
Waukesha, Wis.

MANAGEMENT, supervision, and the men working in plants today should realize that every machine and every piece of equipment is doing a harder job than it has ever been called on to do before. Consequently, some form of checkup is necessary, and this checkup must be more rigid than ever before.

Moving equipment, such as an electric truck designed for a 2000-pound maximum load, today is hauling in our plants probably from two to three times that amount. Putting such a load on this piece of equipment sets up undue stress in moving parts, bearings, axles, rubber tires, and the frame.

When trucks in our plant become hard to handle, we bring them into the maintenance department and tear them down completely. All moving parts are washed in a kerosene bath and cleaned so that we can examine them thoroughly and determine which parts can be used again. Worn parts which can be salvaged by welding, remachining and, when necessary, heat treating, together with the necessary new parts, are then installed in the trucks. This method not only makes the trucks almost as good as new but also prevents a lot of equipment from being thrown on the scrap pile. In addition, the life of these trucks has been prolonged in some instances up to 25 years.

Six rubber-tired trailers employed in hauling castings from the annealing department to the chipping and cleaning department had always given trouble through faulty construction and overloads. Since we were unable to obtain rubber tires for these trailers, we designed a new type steering gear with a malleable wheel for which we made a pattern and a new type axle. Results are even better than anticipated. The trailer is easier to steer and can stand a heavier load.

Molding machines frequently are a problem in the foundry. Through overloading we had trouble with undue wear on moving parts such as bearings, shafts and cylinders. The machines were taken apart to find what parts could be salvaged. Cylinders were rebored and fitted with new sleeves, and new bushings, shafts, etc., were installed. The machines were painted and put back in service as good as new. This has been done over and over again. Through this method we have put into use machines which some foundries no doubt would have considered scrap.

Revamped Grinders

The same situation has developed on our grinders, especially with the old type stand grinder which has a flat belt and line shaft drive. We revamped these with larger motors and V-Belt drives, to the extent of installing a larger center grinding wheel. This saved on the purchase of grinding wheels and also increased productivity.

Under present conditions it is difficult to get new tumbling mills and sand blast barrels. We cut the large bellies out of our old barrels and welded laminated plates in place, a simple method of repair which made the barrels like new.

Our dust collecting equipment was in fairly bad shape, nothing but a shell. After consulting several manufacturers of this type of equipment, we decided upon a bag type collector. We used the old shell and added more capacity where needed.

In our plant the sand cutter operator reports anything he might see wrong with his machine so that maintenance men immediately can locate the trouble. Spare parts are kept on hand, and a transmission housing, spare reel or reel clutch can be slipped into place within an hour's time if necessary. On our reels we have always maintained that we obtained better results in cutting sand with the thin blade. Since the reel takes terrific punishment at times from sprues, gates and castings left in the sand heap, we have found it advisable to make up

(*Concluded on page* 141)

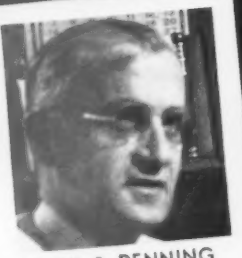
Ampco Metal Awarded Army-Navy "E"

Presentation of the Army-Navy "E" flag and employe pins to Ampco Metal Inc., Milwaukee, was held May 16. C. J. Zaiser, president of Ampco, accepted the flag in the name of the company, while D. J. Ruppenthal, president of the Employes Mutual Benefit Association, made the acceptance speech for the employes. Shown examining the flag are, left to right, Mr. Zaiser, Mr. Ruppenthal and George K. Dreher, works manager

Ask the SCHUNDLER Technical Men *about* BENTONITE

When you have a question about Bentonite and its use . . . present it to the Schundler technical staff, the largest scientific staff working in the best equipped laboratory in the Bentonite industry. Your questions will be courteously and conscientiously answered.

In using Schundler Bentonite, you are sure not only of technical service but also of a strictly first quality product and the experience of a pioneer producer.



PAUL S. DENNING
Research Director

FRANCIS COBB
Research

AMEL AMBERSON
Control

24 Hour Service

TO MOST FOUNDRY CENTERS

Akron, Ohio	H. S. Steller
Birmingham, Ala.	Foundry Service Co.
Boston, Mass.	Klein-Farris Co., Inc.
Chattanooga, Tenn.	Frank Robbins, Jr.
Chicago, Ill.	B. J. Steelman
Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
Edwardsville, Ill.	Midwest Foundry Supply Co.
Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N. Y.	F. E. Schundler & Co., Inc.
Los Angeles, Cal.	Independent Fdy. Supply Co.
Milwaukee, Wis.	Thomas H. Gregg
Minneapolis, Minn.	Smith-Sharp Co.
Moline, Ill.	Midwest Foundry Supply Co.
New Orleans, La.	Barada & Page, Inc.
Oklahoma City, Okla.	Barada & Page, Inc.
Philadelphia, Pa.	Penn. Fdy. Sup. & Sand Co.
Portland, Ore.	Miller & Zehrung Chemical Co.
St. Louis, Mo.	Midwest Foundry Supply Co.
Oakland, Cal.	Industrial Supply Co.
Seattle, Wash.	Carl F. Miller & Co.
Toronto, Canada	Muir Foundry Supply Co.
Tulsa, Okla.	Barada & Page Supply Co.
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Mexico D. F., Mexico	N. S. Covacevich

Many Products for Foundries

Other items in the fast-growing line of Schundler products for Foundries are:

FESCO FIRE CLAY—A top quality fire clay for cupola linings and ladle linings.

FESCO BOND—A bonding clay of the first order. Excellent record of performance.

TALC (SOAPSTONE)—Equal in quality to the best imported products.

Now is a good time to present your problems to Schundler technical men. They can help you meet urgent war requirements.

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F. E. SCHUNDLER & CO., INC.

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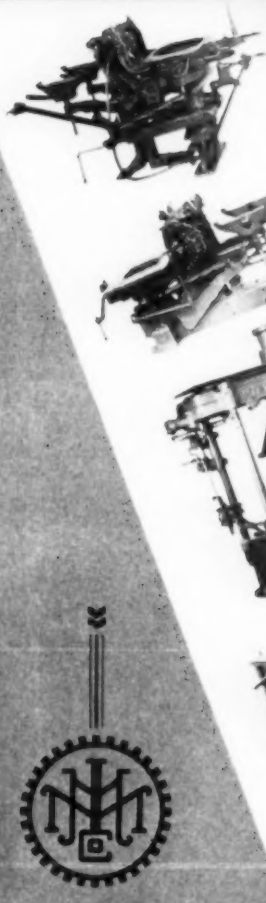
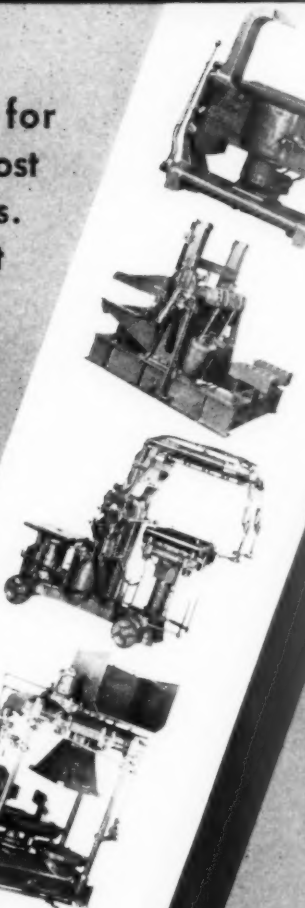
INTERNATIONAL MOLDING MACHINES



Castings are required for building many of the most vital War Implements. The castings are almost invariably the first parts that are needed when the construction of the implement starts



WAR Implements must be made in large quantities and all parts used in their construction must be turned out on a **HIGH PRODUCTION** basis—with ceaseless continuity and perfection.

USE INTERNATIONALS to insure the maintenance of casting production schedules. Call for **INTERNATIONAL** Service Engineers to demonstrate the latest developments in **HIGH SPEED** equipment and methods.

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READER'S COMMENT • • •

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*
THE EDITORS

Metal Pouring Device

TO THE EDITORS:

In our aluminum foundry we are using a metal pouring device on our open-hearth furnace. This rotary device is for the purpose of eliminating the metal running between the pig molds and causing a great deal of maintenance of the chain.

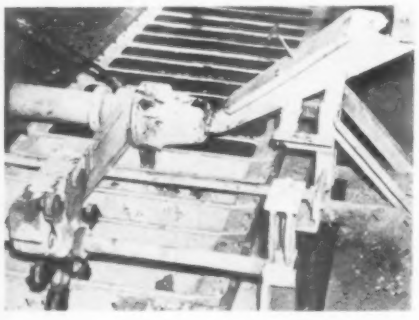
An article on this device was run in FOUNDRY magazine and no mention was made of the man who conceived the idea. Elmer Smith in our maintenance department conceived this idea and helped quite a bit in its development, for which the company awarded him $300 in Defense Bonds.

E. E. WARD

Delco-Remy Division
General Motors Corp.
Anderson, Ind.

EDITORS' NOTE:

The device referred to and reproduced here appeared in an article on the Packard Motor Car Co. aluminum foundry in the April issue



of THE FOUNDRY, page 139, under the caption *"Close-up of automatic pouring lip. Rotating head has four slots through which metal flows into molds. Speed of rotation is geared to mold speed so that spilling does not occur."*

Negligible Permeability

TO THE EDITORS:

In the article by Howard Linn Edsall of the Ajax Metal Co. in the May issue of THE FOUNDRY, the statement is made that, "it is well known that harmful gases contained in the combustion by-products of the melting furnaces are transferred to the melt through crucible walls, or absorbed by exposed surface areas of the molten charge."

It is certain that this statement is incorrect as applied to the clay bonded, flake graphite crucible, whose walls have negligible permeability in the direction through the walls at furnace temperatures.

Possibly the author had in mind iron pots which at ordinary furnace temperatures are permeable, and competent observers have attributed gassing of the metal to the porosity of iron pots.

The manufacturers of crucible furnaces for melting aluminum have provided for effective disposal of the waste gases so that the danger of gassing the metal through direct contact with the gases is excluded.

Mr. Edsall states in his article, "stirring is more apparent in induction furnaces when melting light metals." When melting copper base alloys a constant flow of metal is visible on the surface of the melt so the assumption is that this movement is even more pronounced when melting aluminum. This constant exposure of new metal to the atmosphere seems undesirable. As Mr. Edsall states, "a flexible oxide film is formed on the surface of the molten aluminum," and in the case of crucible furnaces where the circulation of metal is much less than in the induction furnace, this film constitutes adequate protection against further oxidation.

Graphite crucibles are so widely used that there can be no doubt of their superiority where pure, ungassed low iron aluminum alloys are desired. While some foundries did install iron pots during the last year due to the threatened shortage of graphite, now however, thanks to the efforts of the WPB Mica-Graphite Section of the Materials Division, sufficient crucible graphite is available to supply all requirements of the war industries for crucibles.

RICHARD H. STONE

Vesuvius Crucible Co.
Swissvale, Pa.

Still Going Strong

TO THE EDITORS:

You may be interested in the accompanying picture of J. W. DuBois, 75, a foundryman since 1879 and still able to play a bass viol for a period of 8 hours with only 15 minutes out for lunch. The instrument is between 300 and 400 years old and was rebuilt by the writer. It was repaired at least once before in 1775 in Belgium. The spools are hammered wrought iron. I have played this instrument for many years before small and large audiences and have been applauded to a highly gratifying extent. Some day you shall hear me on the radio! I play all kinds of music—from Cavatima, Tiest, Tales of Hoffman and Ave Maria to hill-billy melodies. I have always contributed my services free of charge. During the past two years many brave boys have gone to war with my

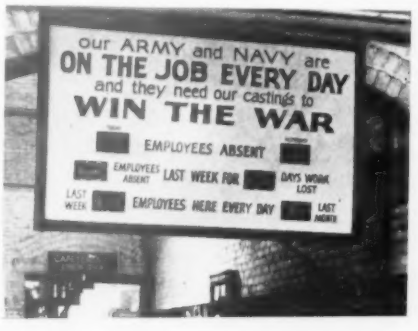
music ringing in their ears and many a tear has rolled down the cheeks of those who remained behind while listening to the music of the old bass viol.

J. W. DUBOIS

Cold Spring-on-Hudson, New York

Records Absenteeism And Attendance

Employes of the Hamilton Foundry & Machine Co., Hamilton, O., are given a constant reminder of the plant's absentee experience and the importance of being on the job every day. The accompanying illustration shows one of the


our ARMY and NAVY are
ON THE JOB EVERY DAY
and they need our castings to
WIN THE WAR
EMPLOYEES ABSENT
EMPLOYEES ABSENT LAST WEEK FOR DAYS WORK LOST
LAST WEEK
EMPLOYEES HERE EVERY DAY
LAST MONTH

company's absentee and attendance record boards at the time clock entrance to No. 2 foundry. Figures are entered daily to show number of employes absent, together with the record for the preceding week and the attendance for both the preceding week and month.

Castings Poured Directly

FROM PORTABLE FURNACE

MORE than 2500 aluminum castings for an important piece of army equipment have been made with a 1000-pound capacity portable melting furnace and ladle combination at General Electric Co.'s Schenectady Works with a negligible percentage of rejects. The portable furnace obviates the need for superheating its charge to the point where oxidation would be excessive, and by permitting a direct pour from furnace to mold, does away with the problems of preheating transfer ladles and crucibles.

The portable combination is a conversion of a standard oil-fired furnace and ladle, and was developed by H. J. Hunt, a foreman in the company's foundry. It is trunnion-mounted, with two-eyed plates welded on both of the frame uprights for lifting the entire assembly by a four-hook sling.

The furnace is fired by a removable burner easily attached to the sidewall by sliding it into a semi-circular flange and locking it down with a wing nut. The burner fixture fits against the furnace wall at a tangent so that the flame is spiralled downward into the charge. Oil is fed through a flexible metal hose, and air through a rubber hose.

As the casting for which the furnace is used is about ½-inch thick, the best pouring temperature is from 1290 to 1310 degrees Fahr. Ordinarily it would be necessary to heat the aluminum charge to as much as 1470 degrees Fahr. but with the portable furnace-ladle combination it is only necessary to go up to 1380 degrees.

The furnace is lined with fire brick, and needed only two relinings in handling more than 2500 charges. A graphite crucible would have had to be replaced much more often.

About one-third of the more than 2500 castings made with the portable furnace were of an aluminum alloy of about 5 per cent silicon, balance aluminum, corresponding to Navy Specification 46A1, Class 2, and among those there were no rejects. What little difficulty was encountered was not the fault of the furnace, but was due to inexperience in handling another metal when a shift was made to an aluminum-copper-silicon alloy (4 per cent copper, 2.5 per cent silicon, balance aluminum) corresponding to Army-Navy-Aeronautical Specification AN-A-4. No "cold shots" were experienced on any of the castings, indicating proper temperature.

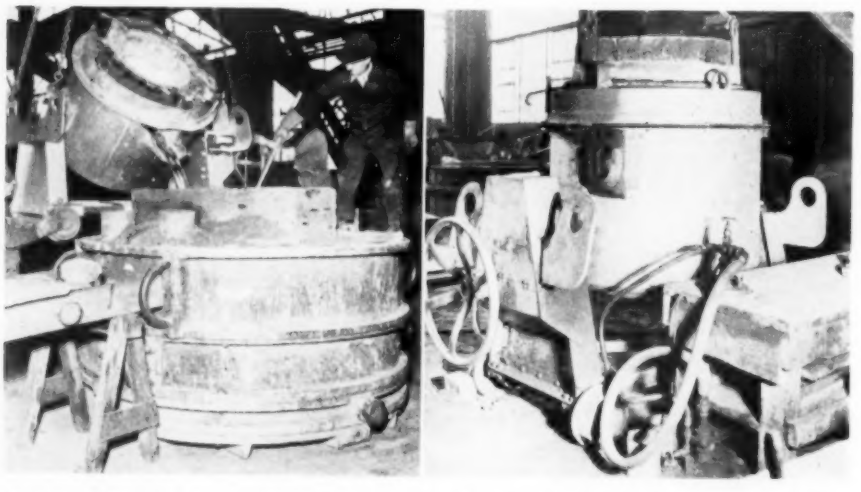
The portable furnace and ladle combination, loaded with its charge, weighs about 3 tons.

Waive Royalties on Bessemer Control

Jones & Laughlin Steel Corp. and Whiting Corp. have announced that effective as of April 1, 1943, until further notice, payment of royalties by licensees will be waived in connection with use of bessemer flame control in the operation of side-blow converters for production of steel castings.

In 1940, Whiting Corp. was appointed by Jones & Laughlin to negotiate licenses for the use of electric eye control equipment for the production of steel for castings in side-blow converters. The original application of the method covered by the patent had been limited to the large bottom-blow bessemer converters used in steel mills, but after some modification by Whiting Corp. of the equipment used in the mills, the electric eye is now employed in the operation of small side-blow converters.

The two companies stated that the advantage to the foundry industry that may be gained through the practice of the invention, particularly during the present emergency, justifies waiving of the royalty fees heretofore charged to licensees.



(Left)—1000-pound capacity combination oil-fired melting furnace and ladle in pouring position. (Right)—Close-up of the portable unit idle showing the removable burner and its leads in the foreground, and flange on the furnace sidewall for mounting it

Foundry Booklets

National Founders Association, 120 South La Salle Street, Chicago, recently issued a series of booklets covering various foundry operations, and written specifically for the attention of the man in the shop. The latest unit *Cleaning Castings* is No. 4 in the series which includes No. 1, *The Cupola;* No. 2, *Molding and Coremaking;* and No. 3, *Nonferrous Foundry.* In the latest of the series, equipment and methods for cleaning castings in the foundry are presented under the following heads: Tumbling mills, blast mills, blast tables, blast rooms, blast cabinets, airless abrasive cleaning, hydraulic cleaning, wet tumbling, hydroblast, pickling tanks, pedestal grinders, swing grinders, portable grinders, disk grinders, air chisels.

Salvages Equipment

(*Concluded from page* 138)

a spare reel which can be installed on very short notice.

It should not be necessary for me to stress or go into detail on the importance of oiling and greasing the moving parts of all machines.

Rough usage of steel flasks by shakeout men using sledge hammers makes it necessary to turn the flasks over to the maintenance department for welding in new corners and straightening. This postpones purchase of new flasks and has been found an economical practice. However, I would advise the use of shakeout bails with air hammers, made in all shapes and sizes, to overcome rough usage of flasks.

The pulverizing system in one of our plants caused the steel work around the skylights to rust. Freezing temperatures outside and the warm gases inside formed a mild form of sulphuric acid which caused excessive deterioration of the window frame steel work. We removed all of the glass, took the frames down and cut out the unsalvagable parts. We then made a jig for the window frame and welded together new angle bars, T-bars, and channels. The finished frame was as good as new, thereby saving the skylight.

One of the most important factors in a salvage program is the man who determines which machine is to be salvaged and which is to be scrapped. Full authority should be given him to decide on these matters. He can designate the necessary parts to be purchased and can be instrumental in making the men in the shop salvage conscious.

From a paper presented before the Wisconsin Chapter of the American Foundrymen's Association at Milwaukee, Jan. 15.

STANDARD HORSE NAIL CORPORATION

NEW BRIGHTON, PA.

FOUNDRY CHILL NAILS

MACHINE KEYS

TAPER PINS

COTTER PINS

KOOL HEAD FOUNDRY CHILL NAILS

SLIM BLADE

Made in Lengths Over All
1 1/16" 2 1/16" 2 1/16" 2 3/4" 3 1/16"

MEDIUM BLADE

Made in Lengths Over All
2 1/16" 2 1/16" 2 3/4" 3 1/16"

HORSE NAIL BLADE

Made in Lengths Over All
2 1/16" 2 1/16" 2 1/16" 2 1/16"

JUMBO PATTERN

Made in 3 1/16" long only

HORSE NAIL SECONDS

Suitable for Chilling Purposes
But not for Shoeing
Sizes No. 5 to No. 11

HORSE NAIL STUBS

Made in Lengths
1" 1½" 2"

CAST ZINC-BASE DIES

Produce Aircraft Stampings

THE aircraft industry uses many stamped or formed parts of aluminum alloys, stainless steel and high nickel alloys, which are produced with sand-cast zinc-base dies. According to one estimate the frame of a modern bomber requires about 10,000 such parts, and the die cost on these parts must be amortized over only 2000 to 3000 units. To keep the die cost low the industry turned to high grade or prime western zinc since it could be melted and cast without much difficulty, polished and machined easily, and remelted after it had served its purpose.

However, die life was somewhat short, and investigation of the problem by engineers of Morris P. Kirk & Son Inc., Los Angeles, a subsidiary of National Lead Co., led to the development of a zinc-base alloy containing aluminum, copper and magnesium, which permitted production of 10 to 50 times the number of stampings obtained with straight zinc. The alloy is called Kirksite A, and is claimed to possess several advantages in addition to that mentioned.

The alloy is melted in alloy cast iron pots which are coated with a fireclay wash or similar material to hold iron pick-up to a minimum. A suitable analysis of iron for pots shows 3 to 3.5 per cent total carbon, 1 to 2 per cent silicon, 0.60 to 0.75 per cent manganese, 2 to 2.5 per cent nickel, 1.1 to 1.2 per cent chromium and 0.40 to 0.60 per cent molybdenum. Temperature of the alloy never should exceed 900 degrees Fahr., and if held for long periods the temperature should be limited to 800 degrees. Some form of temperature control is advisable for best results. Pouring temperature ranges from 800 to 875 degrees.

Molding is by the open sand method, and the patterns most commonly used are wood or plaster, although other materials may be employed. In the aircraft industry plaster is used almost exclusively since the patterns may be produced in a much shorter time, and the die drawings are made so that the pattern shop can use the loft template method for producing the pattern. The drawings show the outline of a series of transverse cross sections equally spaced along the center line of the die, and sometimes a second series parallel to the center line. Those loft lines are laid out on thin sheet steel by the patternmaker using a shrinkage scale. While many shops use the full 0.14-inch per foot shrinkage, others claim more accurate castings result when 0.10-inch per foot shrink rules are used.

The templates are sawed out, set up vertically on a level work table, and properly spaced to form a nest of pockets or a honeycomb into which the plaster of paris reinforced with hemp fiber is cast. As the plaster begins to set, the surplus is removed by scraping with a steel straight-edge or curved scraper, using the loft templates as guides for the scraper. This method may be as rough or as accurate as requirements dictate simply by decreasing or increasing the number of templates used.

Any good grade of molding sand with a fine texture can be used for making the molds, Albany and Windsor Locks sands appear to be used most commonly in the East, and San Diego in the West. The sand should be worked as dry as possible. Initial layer of sand over the pattern should be screened into place to eliminate any lumps or foreign matter. Ordinarily venting is not required except in the case of deep molds when wire venting can be used. In general, only one gate is used to admit molten metal to the cavity. It enters the cavity at or near the bottom, and may be of the horn type with the large end opening into the cavity. Since slow pouring produces sounder castings with less distortion, a gate ¾-inch in diameter will produce a 2-ton die free from cold shuts or folds.

Metal Poured in Layers

To reduce distortion to a minimum, the die may be poured in two or three layers. Procedure is to use the gate to pour in say one-third to one-half of the required amount of metal, and allow that to solidify almost completely. Then the second layer is poured directly into the mold. If a third layer is used the same procedure is followed. Complete fusion of the layers is said to occur in this practice.

Flat bottoms on the dies may be obtained by two methods. One is to fill the mold cavity, allowing solidification to take place until only one or two small pools of molten metal are visible. Then the shrinkage depressions are filled with molten metal, and an oxyacetylene torch with a large tip and reducing flame is used to melt the surface layer until the metal levels off. The second method is to fill the cavity to within one inch of the top, and permit the metal to solidify but not become cold. Then pouring is completed.

In the case of heavy dies it is advisable to core out some sections to conserve metal and to lighten the die, as shown in the illustration on page 166. The cores may be dry sand or pre-cast zinc-base alloy. In the latter case the metal core is sprayed with a thin coating composed of 50 per cent whiting and 50 per cent silica flour reduced to the consistency of thin paint; to each gallon of which 3 or 4 ounces of molasses are added.

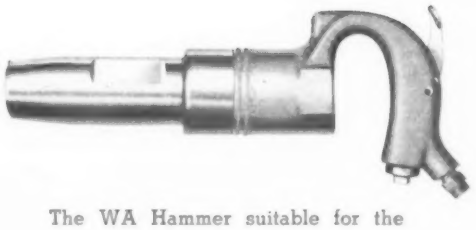
After the dies have served their purpose, they may be remelted. However, considerable care must be taken to see that the alloy has not been contaminated with tin, lead and iron. As little as 0.01 per cent lead causes loss in physical properties on aging while 0.5 per

(*Concluded on page* 166)

Mathieson Receives "E" Production Award

Participants in the awarding of the Army-Navy "E" flag to the Niagara Falls plant of the Mathieson Alkali Works Inc. included the following, left to right: Lieut. Comm. George W. Eighmy, U.S.N.R., assistant to resident inspector of naval material, Buffalo; Col. Harry A. Kuhn, Office of the Chief, Chemical Warfare Service, Washington; G. W. Dolan, executive vice president of the company; and Frank A. Sweet, chairman, Plant Employe Committee of the Niagara Falls plant

BETTER PUT CLECO CHIPPERS IN YOUR CLEANING ROOM!



The WA Hammer suitable for the heaviest chipping work.

★ Using Cleco Chipping Hammers, your men will get more work done, with less air, and less maintenance costs.

Your men will like them because they are easy to handle and control. The throttle valve graduates the air supply so that the tools are easy to start. Furthermore, these chippers are free from recoil and objectionable vibration that are so fatiguing on the operator.

You will like Cleco Chippers because they "stand the gaff." The plunger and chisel bushing are made of hardened tool steel, ground to close limits. The cylinder and handle are made of heat treated alloy steels for extra strength. The valves are practically leak-proof and breakage-proof.

Another feature of Cleco Chippers is the wide variety of sizes and styles, which insure the selection of exactly the right tool for every job. Available in heavy duty, medium and light models, with open or closed handles. Bulletin 75A gives the full story on these valuable chippers. Ask for it!

● *Other Cleco tools for the foundry include sand rammers, grinders and all types of accessories.*

SEE OUR CATALOG IN SWEET'S

THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77th STREET **CLEVELAND, OHIO**

BRANCH OFFICES IN ALL PRINCIPAL CITIES

Nonferrous Group in Regional Meeting

Non-Ferrous Founders' Society held a regional meeting at Cleveland, June 14, for the purpose of reporting to members of the industry on activities of the organization. The board of directors met during the day, the general meeting being held in the evening, with Chester K. Faunt, Christensen & Olson Foundry Co., Chicago, and president of the society, presiding.

A report on the society's actions with respect to its request for amendments to Revised Maximum Price Regulation 125 of OPA was presented by Edwin W. Horlebein, chairman of the group's Washington contacts committee, and president, Gibson & Kirk Co., Baltimore. The committee had urged OPA to name an advisory committee of nonferrous foundry industry members to act in a consulting capacity on subsequent pricing matters affecting nonferrous castings, and Mr. Horlebein stated that OPA finally has acceded to this request.

Both Mr. Horlebein and R. M. McClure, secretary-treasurer of the society, emphasized the necessity of dealing with Washington through an organization representative of the indstry, rather than as individual companies, and the importance of building up a strong trade association.

Membership in the Non-Ferrous Founders' Society has grown consistently since its formation, it was pointed out by Thomas S. Hemenway, Metal & Alloy Specialties, Buffalo, and chairman of the membership committee. More than 170 foundries were reported enrolled, with a drive for additional members being pushed.

To Work With WPB Advisory Group

Organization of four technical groups, to work with the Ferrous Foundry Industry Advisory committee of the War Production Board, was announced to the group at its fourth meeting with WPB Steel Division officials on May 20.

The technical groups will advise the government on technical and engineering problems which develop in the following major ferrous foundry fields: Gray iron, malleable castings, steel castings and heat and corrosion resistant products.

Steel division officials outlined to the committee current problems in the use of alloying metal for foundry products, as well as summaries of the general raw materials situation in the foundry field.

E. D. Pratt, of the Steel Division, Metallurgical and Conservation Branch, presented a statistical summary of total requests for alloys for use in foundry products, which showed that requests for nickel, chromium and molybdenum in May were lower, on a per ton basis, than they were in April. Total molybdenum requirements, nevertheless, were in excess of supply.

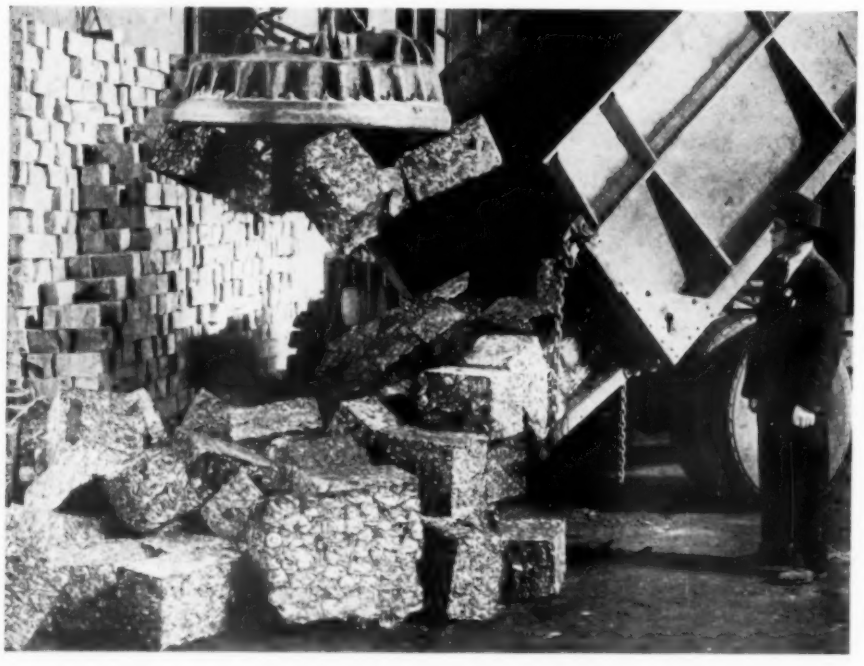
E. J. Hergenroether, deputy chief, Metallurgical and Conservation Branch, reported that proper utilization of alloy steel scrap remains one of the most urgent problems. He pointed out that Order M-24-c requires segregation of scrap by classes, and that in some instances, there has not been full compliance with the order.

It was brought out at the meeting that producers of foundry products who desire to use copper scrap must note that fact on the PD-707 form submitted to the Steel Division for allocations of alloying metals. The use of copper scrap in ferrous foundry products will not be authorized by the Copper Division unless the request is screened first by the Steel Division through the PD-707 form.

Don J. Reese, chief, Iron and Steel Manufacturers Section, has been named government presiding officer for the Ferrous Foundry Committee, it was announced at the meeting. Until this meeting, H. J. French, chief, Metallurgical and Conservation Branch, had been government presiding officer.

Chairmen of the technical groups appointed are Garnet Phillips, International Harvester Co., Chicago, gray iron; K. H. Hamblin, Grinell Co., Providence, R. I., malleable castings; Victor Zang, Unitcast Corp., Toledo, O., steel castings; and Evan F. Wilson, Babcock-Wilcox Corp., Barberton, O., heat and corrosion resistant products.

Brewery's Loss Is Foundry's Gain



Breweries no longer may package beer in metal containers for civilian distribution, but Caterpillar Tractor Co., Peoria, Ill., finds the empty cans make acceptable scrap. The 12,600 pounds of baled scrap shown here represents some 100,000 cans. Frank W. Shirley, general superintendent of the foundry division, watches the unloading. Most of the cans had been damaged and were donated by the Pabst Blue Ribbon Co. in the interest of the Peoria scrap drive. M. J. Gregory, factory manager of Caterpillar's foundry division, states the material was handled like all of the company's other types of scrap, adding that the fact the cans never contained beer may have accounted for the good quality obtained from the resulting castings

Seating Arrangement Production Factor

Increased industrial output may be obtained by improving seating facilities for workers, according to a study by the United States Department of Labor. The study says one plant found that provision of special "sit-stand" seats in a metal polishing unit increased production approximately 32 per cent. Investigations have proved that muscular ability increased 6 to 15 per cent when workers were permitted to sit and stand alternately. Excessive standing or improper seating at the job will prevent peak production and may cause accidents.

Supervising Women War Workers

A booklet entitled, "Supervising the Woman War Worker" has been prepared by the National Foremen's Institute, Deep River, Conn. The report is covered in 34 pages, and the topics discussed include hiring, induction, wages, uniforms, safety, reprimanding, teaching. The booklet has two lists, one of jobs women are now doing, and the other, jobs women can do.

FAST, THOROUGH SAND Mixing

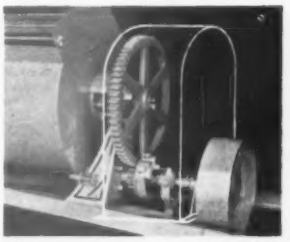
WONDER SAND MIXERS

EXCLUSIVE TRIPLE MIXING HOES!

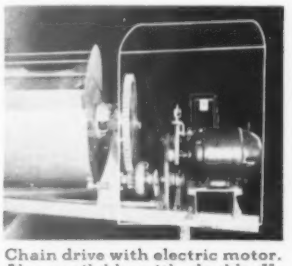
Here's new mixing efficiency that foundrymen need today. Triple mixing Hoes have adjustable blades . . . easily set for correct clearance. Thorough end to end mixing. Scientifically shaped drum with safety grating . . . flared for easy charging and discharging. Carbon steel hoe shaft with self-aligning bearings. Leak-proof stuffing boxes that can be adjusted while Mixer is running and repacked without dismantling machine. Pictured . . . No. 6—6 cu. ft. mixed capacity. Also available in larger size.

SPECIFICATIONS

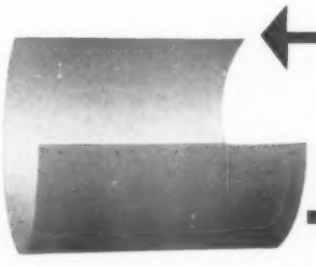
Mixing Drum				Hoe Shaft		Power	Countershaft	
Mixed Capacity	Diam.	Length	Thickness Shell	Diam.	Speed	Required	Diam.	Speed
6 Cu. Ft.	28"	30"	10 Ga.	1 11/16"	28	3-5 H.P.	1 1/4"	167



Showing 16" x 5" belt pulley and friction clutch for line shaft drive.



Chain drive with electric motor. Also available with double V-Belt Drive.
Can be furnished without power but with countershaft for your 1200 or 1800 r.p.m. motor.



RENEWABLE DRUM LINERS!

Quick replaceable full-hard abrasion resistant alloy steel drum liners . . . add little to cost—lots to life.

CONSTRUCTION MACHINERY CO.

WATERLOO . . . IOWA

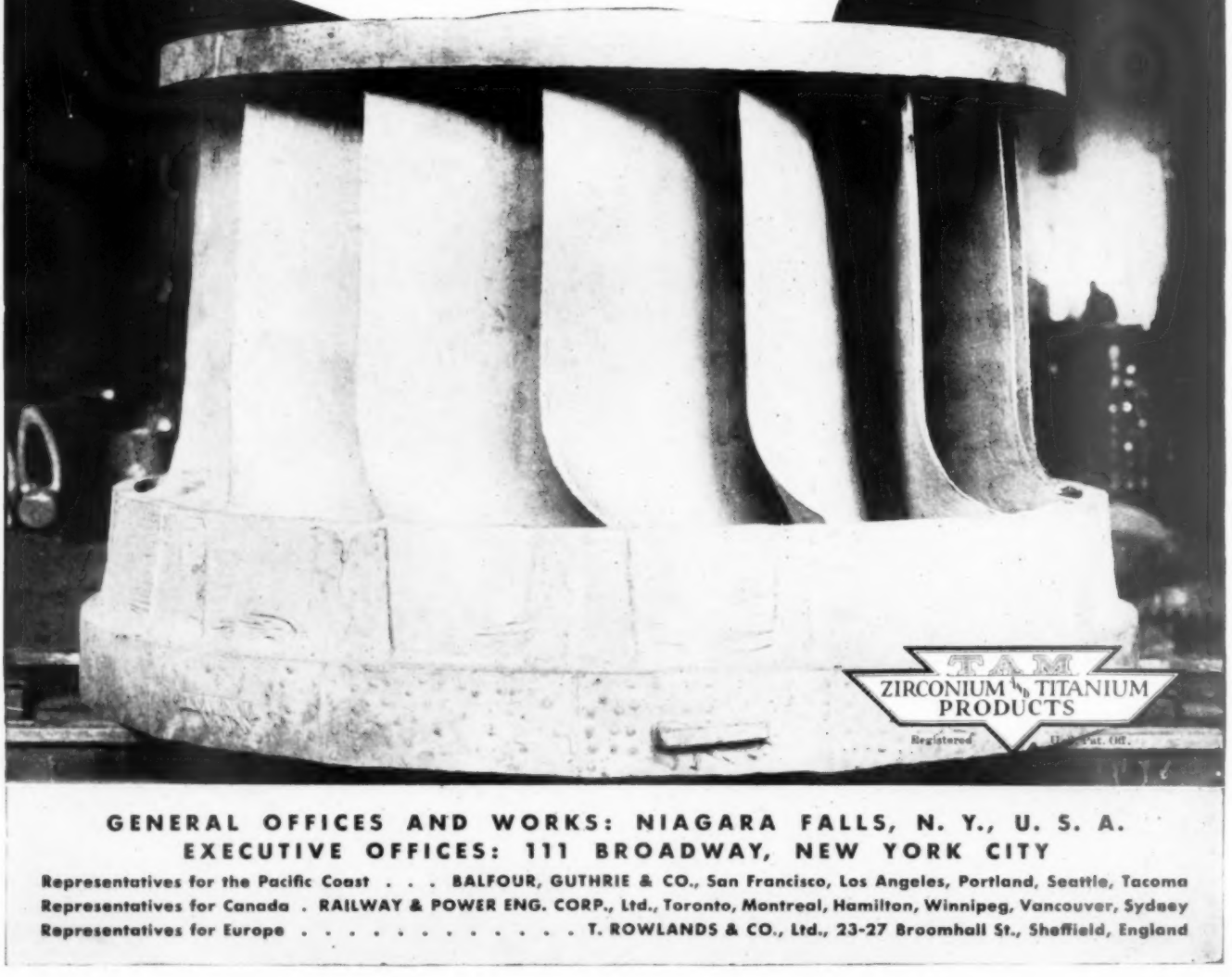
SMOOTH FACES FOR CASTINGS

TAM Zirconite super-refractory mold and core washes produce smoother surfaces and reduce cleaning costs

By resisting the burning-in of the molten metal, TAM Zirconite Mold and Core washes speed up output of good castings by reducing the number and time of cleaning and finishing operations. Available in three grades: Zirconite A has a melting point above 3775° F.; Zirconite B has a melting point above 3600° F.; and Zirconite C, for special uses, has a melting point above 3600° F. They are quickly mixed by adding to water, and can be applied by either spraying, swabbing or painting on cores and molds. Write for complete details, today.

TITANIUM ALLOY MANUFACTURING COMPANY

Zirconite Wash was used on this 94,000 pound .30-.35 carbon steel casting—11'6" high 14' diameter. Of special interest is the fact that no nails were used in the facing.



GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma
Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

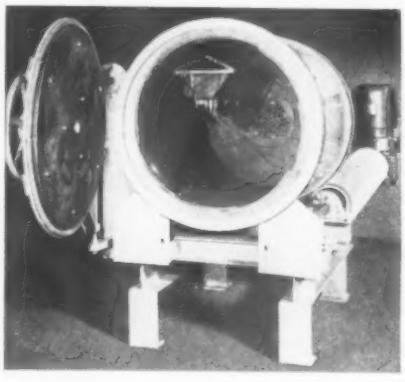
NEW EQUIPMENT and SUPPLIES

Safety Goggle

American Optical Co., Southbridge, Mass., announces a new safety goggle with 6.00 curve clear lenses to protect eyes of women industrial workers. Specifically designed to fit the smaller features of women, the new goggle is made in 42 mm. eye size and is available in three bridge sizes, 19, 21 and 23 mm. Bridge is double-braced, and earpieces have perspiration-proof insulation. No metal touches the skin. Lenses are annealed for fracture-resistance and conform to Specifications of U. S. Bureau of Standards on requirements for an eye-protection lens.

Air Blast Barrel

Dreisbach Engineering Corp., 45 Warburton Avenue, Yonkers, N. Y., is offering a new design of its air blast barrel.



It incorporates an all-steel barrel and frame, adjustable bearings for roll shaft, direct roller chain drive and ½-inch steel lining plates inside the barrel which can be easily replaced. Dust exhaust is designed to permit a large volume of air to pass through the barrel while preventing escape of the abrasive. Exhaust pressure is about 2 ounces; maximum volume required for operating at any pressure up to 100 pounds is about 400 cubic feet per minute. Abrasive being returned to the stationary hopper passes through a removable hopper screen which removes all core wires and nails. The barrel revolves only one to two turns per minute in order to prevent breakage of treated parts. Time for cleaning may vary from 5 to 30 minutes, depending upon various factors such as air pressure, type of abrasive, condition of material and finish required.

Dump Hopper

H. L. Pitcher Co., 12400 Strathmoor Street, Detroit, announces a new model automatic end dump hopper mounted on casters. When the latch is released and

the load is dumped, the bucket is so balanced that it automatically returns and latches in position when reloaded. It rides empty in the balanced position. It is particularly adapted for handling sand, gravel, small castings and all kinds of scrap. Designed to fit any kind of lift truck, it may be built to specifications.

Motor Starter

Allis-Chalmers Mfg. Co., Milwaukee, announces a new starter for induction and synchronous-type motors rated up to 1000 horsepower at 2300 volts and 1750 horsepower at 4600 volts, 3-phase, 60 or 50 cycles. Its application covers full or reduced voltage starting, dynamic braking, reversing and special applications. Designed for low first cost, the starter is a metal-enclosed unit. Short circuit protection is provided up to 160,000 kva at 2300 volts and 320,000 kva at 4600 volts.

Trailer Truck

Yale & Towne Mfg. Co., Philadelphia, has developed a trailer type hand lift fitted with safety self coupler front and rear, to handle all types of loads on skids, bins, dump body skids and special type skids. To form a train the operator pushes trucks together. Front and coupler loop slides through jaw ends of the other truck coupler, pushing the latch which automatically drops into locked position. To break train the operator steps on the pedal pad of the latch casting. A full load may be elevated by a few strokes on the lift truck handle. When not functioning in trailer train formation the truck serves as a conventional hand lift truck. The truck is available in capacities up to 20,000 pounds.

Grinding Bench

American Air Filter Co. Inc., Louisville, Ky., has developed a semi-enclosed bench assembly especially for safety in burring, filing and flexible shaft grinding of magnesium. The unit provides down-draft ventilation through wood grilles and is furnished complete with tool shelf, fluorescent lights and partitions between stations. It is also available in small individual units which can be located directly in back of magnesium grinding stands. All ledges or recesses where damp magnesium dust could be

deposited are eliminated. Magnesium dust is precipitated and stored under water, and any hydrogen resulting from reaction of magnesium and water is automatically vented whether the fan is stopped or in operation. Benches and units are made in sizes with capacities from 1000 to 20,000 cubic feet per minute. Benches are furnished single with one to three work stations or double (back to back) arrangement with as many as six stations.

Dust Collector

Barger Sheet Metal Co., 12401 Euclid Avenue, Cleveland, has designed a new portable dust collector which can be used

either to supplement larger, permanent systems or used in place of such systems. Capacity of 600 cubic feet per minute will normally handle dust from two 9-inch grinding wheels, whether mounted together or separately. It is powered by a ⅛-horsepower motor operating a blower at 3400 revolutions per minute is 37-inches high, 27-inches wide and 13-inches deep. Collector does not exhaust air from the shop, returning it approximately 97 per cent clean and slightly warmer than before.

Lift Truck Scoop

Towmotor Corp., 1226 East 152nd Street, Cleveland, is offering a new shovel type scoop for attachment to its standard lift truck. Available in capacities from 8 to 25 cubic feet, it is designed to

speed handling of bulk materials, such as foundry sand, scrap, etc. It is also adapted to handling small castings in large quantities. Manually controlled, the scoop can pick up or dump materials at any point within the lift range. Lowering the scoop to floor level after dumping causes spring-operated catches to hold it to digging or carrying position. Anti-spilling device which fits over the front lip is an optional feature of the new shovel type scoop.

Welding Electrode

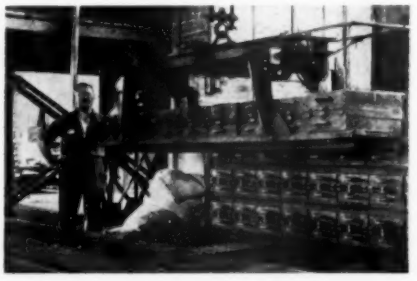
Harnischfeger Corp., Milwaukee, has introduced a new all-position electrode designed especially for use with alternating-current transformer welding machines. Suited for all mild steel applications, it is being made in usual sizes of ⅛ to 5/16-inch diameters and in 14 and 18-inch lengths, packed in standard 50-pound lots.

Atmosphere Indicator

Claude S. Gordon Co., Chicago, has placed on the market a new furnace atmosphere indicator developed and manufactured by the Weaver Mfg. Co., Springfield, Ill. Based on the thermal conductivity method of analysis, the indicator is in continuous operation during the entire heating cycle and enables the operator to detect any atmosphere change of consequence which may take place due to variations in the gas supply. It also permits duplication of a desired atmosphere for a given operation by adjusting the air-fuel ratio to give the same indicator reading.

Load Grab

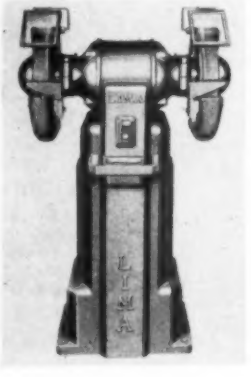
J-B Engineering Sales Co., 310 East Street, New Haven, Conn., has designed a type of grab for picking up pallet loads



of foundry flasks by a simple turn of the handwheel. As shown in the illustration, it can be used to remove pallets which may be stored on a roller conveyor and move them to the shakeout or to other points. Other uses are in handling pallet loads of castings in heat treating operations and in loading on cars. Available in capacities dependent only on the requirements, the unit is built for either hand or motor operation.

Pedestal Grinder

Lima Electric Motor Co., Lima, O., announces a new tool room pedestal grinder, designed as a 2 or 3 horsepower unit, 1800 revolutions per minute, operating on 2 or 3 phase alternating current, 220, 440 or 550 volts. Wheel size on both models is 12 by 2 inches,



with wheel arbor diameter 1¼ inches. Model 24S measures 20¼ inches between wheels; model 25S has 24-inch spacing. Arbor height is 39 inches and overall height 45¾ inches on both models. Motor is totally enclosed with push button control, overload protection and heavy duty ball bearings. Improved safety wheel guards equipped with exhaust vents, adjustable tool rest and combination lift out water pot and tool tray are other features.

Dump Skid Box

Union Metal Mfg. Co., Canton, O., has developed a drop-bottom dump skid box used in connection with a standard fork or high-lift power truck. It consists of an all-steel box attached to a skid platform with a continuous hinge at one end. Steel plates are welded to the skid at a point equal to length of the forks or platform on the truck to hold the skid in place. Latch rings attached to the top rear of the box are hooked over a

plate welded to the truck mast when the unit is being used. In operation, when the forks are lowered the skid portion goes down while the box portion goes up, as illustrated. Side plates, which form a chute, may be extended to the box top and a crane loop welded to each plate, allowing the unit to be handled by crane for transporting or tiering. The unit also may be used as a standard skid box.

Cleansing Compound

Dennis Chemical Co., 2701 Papin Street, St. Louis, is offering a new compound for removing lacquer, dopes and paints from the hands without the use of explosive solvents. The compound is worked into paint or lacquer on hands and then rinsed off with water.

Identifying Machine

Dravo Corp., 300 Penn Avenue, Pittsburgh, is distributing a new electrical instrument designed for identifying instantly, by the use of reference specimens, any ferrous alloy. A known sample is affixed to one of two clamps, and the unknown specimen to the other. When the two pieces of metal are brought into contact, the lighted indicator registers on an easily read scale

(*Continued on page* 152)

CERTIFIED CASTINGS

Zyglo reveals cracks in cast aluminum valve body.

ZA-2D Zyglo unit, one of a complete line designed according to the size and volume of parts to be inspected. This is a single compact unit. Others for larger volume consist of sectional units for each step of the Zyglo Method.

Flaw detection has become such an important factor in wartime production, that a good percentage of all castings in magnetic metals are put through a Magnaflux* inspection. *Now, "Zyglo," for non-magnetic parts will boost the percentage of castings possible to inspect prior to assembly.* In current volume, aluminum, magnesium, and other non-ferrous metals account for a big share.

The interesting question for foundries is whether other departments or customers should make the inspection, or the foundry discover its own "rejects." Foundry control of flaw detection will certainly build up a high reputation for "certified" quality—an enormous asset in postwar competition. Zyglo, by clear, easily interpreted fluorescent indications, reveals shrinkage cracks, porosity, and all surface discontinuities in general. It is not a laboratory but a practical shop technique. The equipment takes its place on the production line. The entire inspection operation is planned at a speed to keep pace with production.

The Magnaflux Corporation's pioneer work in the field of non-destructive flaw detection provided a sound basis for the rapid development of Zyglo Inspection Equipment. The new method, while opening up an entire field of non-magnetic as well as magnetic parts inspection is similar in routine and application to the widely known basic Magnaflux* Method. Design of dipping stations, rinsing and drain tables and the curtained booth where examination takes place under black light took full benefit of past experience with factory inspection installations.

Post yourself on the possibilities of Zyglo in your foundry production. Write for the new Zyglo Bulletin.

*Magnaflux – the Trade Mark of the Magnaflux Corporation applied to its equipment, materials and methods for magnetic particle inspection.

MAGNAFLUX CORPORATION

5918 Northwest Highway, CHICAGO · New York · Detroit · Dallas · Los Angeles

(*Continued from page* 150)

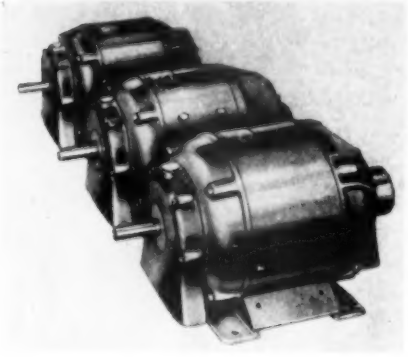
whether or not the two are of the same chemical analysis. About the size of a small cabinet radio, the machine is manufactured by American Tubular Elevator Co., Pittsburgh.

Monolithic Lining

Ironton Fire Brick Co., Ironton, O., has placed on the market a highly siliceous refractory material for making monolithic linings in ladles, converters, electric furnaces and cupolas. It is a fine grain refractory which is said to possess excellent workability as a ramming material, and at high temperature shows practically no volume change. It has a characteristic pink color, and is shipped in a dry, powdery to lumpy condition. Lumps break down readily with addition of water to develop plasticity. It is claimed that the material will not slag off under high tapping temperatures.

Electric Motors

Robbins & Myers Inc., Springfield, O., announces a new line of electric motors in which all types in any one frame size are interchangeable. Dimensions for polyphase induction, capacitor start



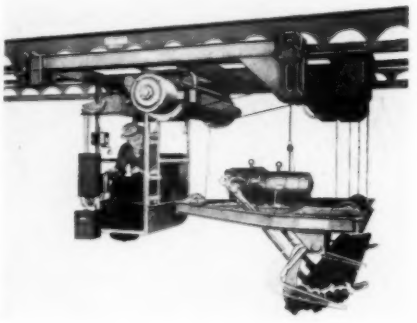
induction, standard direct current, repulsion induction and other type motors are identical, except for slightly different end heads necessary to different motor types. Ball bearing motors are equipped with a double-row-width bearing with a large grease reservoir and complete seals on both sides. Sleeve bearings are made of highest quality cast bronze. Improved insulation also is incorporated in the new motors.

Employe Badge

American Emblem Co. Inc., Utica, N. Y., is offering an identification badge which is re-usable and is said to be tamper-proof. Changes of photographs and color designations can be accomplished only with a special tool. Badge parts are locked with a metal rivet and in sealing, the special closing die engraves an identifying letter of the firm name on the face of the rivet. To dismember the unit, the opening die breaks through the rivet, destroys the seal and loosens the badge parts.

Pipe and Rod Carrier

Cleveland Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, O., has developed a motor-driven pipe and rod carrier which permits the cab operator to pick up 1500 pounds of stock in 12-foot lengths from storage, transport and set it in racks near fabricating machines without any floor men. The 3-point rope suspension from



the carrier provides the necessary rigidity for handling loads out of balance. The double overhead track system minimizes swing and eliminates danger of loads slipping or falling. Rod and pipe are handled by two forks tilted upward for loading and downward for unloading. A limit switch automatically stops the forks in the upward position when the fork is not in operation. The assembly can be raised or lowered as required. The unit shown in the illustration has a lift of 8 feet, but units can be supplied for lifts up to 20 feet or more. Hoisting speed is 20 feet per minute and carrier travel speed is 300 feet per minute. Similar carriers are available for heavier loads and for materials of other lengths.

Photographic Unit

Prentice Products Co., Paramount building, Ft. Wayne, Ind., has available a compact low-priced unit for taking employe identification photographs. It includes a 35-mm. camera, flood lights, legend board and collapsible background frame.

Electric Motors

General Electric Co., Schenectady, N. Y., announces a new line of totally enclosed motors available in both polyphase, 60-cycle induction type and single phase, 60-cycle capacitor type. They are especially designed for use under conditions where abrasives, chemicals, moisture and excessive dirt are encountered. Capacities in both types range up to 2 horsepower. All parts of the motor enclosures are cast iron. Leads and bearing housing are sealed to prevent liquids from seeping into the motor.

Communication System

Executone Inc., 415 Lexington Avenue, New York, has equipped the central control master station of its office and plant communication system with an annunciator selector having a buzzer and name tabs which illuminate to identify incoming calls. Built into a detachable base which can be replaced with larger capacity selectors for future expansion, unit enables user to talk individually to up to 11 other remote stations, or page them all simultaneously. Selector unit is also provided with a tone signal which can be transmitted selectively or simultaneously to all other stations, serving as an alarm, dismissal signal, or method of calling other stations by tone instead of voice.

Welding Positioner

Ransome Machinery Co., Dunellen, N. J., is introducing a new 500-pound capacity welding positioner having center of gravity of load 6 inches away from the table top and a 6-inch eccentricity.

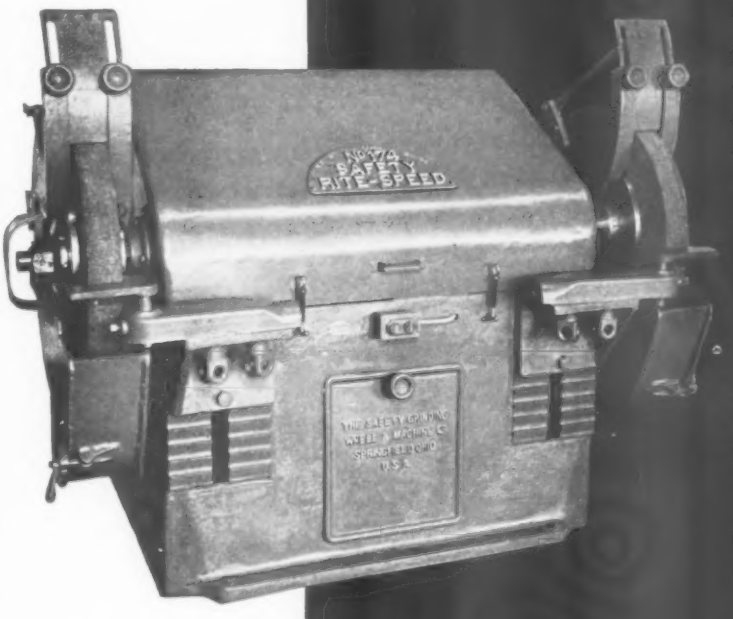
The unit is available in either hand or motor operated models. Tilting range is a full 135 degrees from horizontal, providing the "down under" position for all downhand welds. The 26-inch diameter circular table top is T-slotted. The machine can be furnished with a regular base for bench work or with a sub-base giving height adjustment from 27 inches to 42 inches from floor line to table top. A clutch arrangement permits free rotation of the table top by hand when required.

Tannic Acid Spray

Gebauer Chemical Co., 9410 St. Catherine Street, Cleveland, is marketing a stable, tannic acid solution for treatment of industrial burns. Closure of the bottle in which it is furnished is an automatic device which permits spraying the solution directly over the burn area. The solution is anticeptic and forms a tannic film over the area to which it is applied.

SAFETY "Rite-Speed"

DOUBLE END STAND GRINDERS



"RITE-SPEED" Double End Stand Grinders are the result of years of research work of Safety engineers to determine a positive, convenient, safe means of maintaining the grinding wheel surface speed, suitable for the most efficient, economical production.

"RITE SPEED" DOUBLE END STAND GRINDERS FEATURE A CHANGEABLE SPEED AND INTERLOCK

The interlock automatically cuts off the power when the grinding wheels wear to a predetermined diameter. The changeable Speed System enables the correct Surface Speed to be reestablished by increasing the r.p.m. of the spindle at various diameters.

There are many additional advantages to "Rite-Speed" Double End Stand Grinders.

1. *Very low maintenance cost—Infrequent oiling periods.*
2. *Accessibility of all the working parts. Motors are not in base or on the floor.*
3. *Motor and belts are completely covered, protecting them from mechanical injury and also protecting operator.*
4. *Automatic starters (operated by a push button on the front of the base).*
5. *Corners of the bases are cut away for the convenience and comfort of operator—Long pieces may be ground without interference at front of machine.*
6. *Only standard ball-bearing motors are used—no special motors being necessary.*

These Safety "Rite-Speed" Double End Stand Grinders solve the most serious problems in the following ways:

A "RITE-SPEED" GRINDER WON'T RUN UNDER THE FOLLOWING CONDITIONS:

1. *When grinding wheel wears to a predetermined diameter, the machine stops automatically.*
2. *When operator is changing speeds; no chance to get caught.*
3. *When belt tension is not correct; i.e., when position of motor does not correspond to size of drive pulley.*
4. *When size of drive pulley and position of motor do not correspond to diameter of grinding wheel.*
5. *When lowest speed is not provided in mounting a new, full-sized wheel.*

"Rite-Speed" Double End Stand Grinders are not an experiment—hundreds of these machines are in successful operation in plants throughout the country. For further details, write for "Rite-Speed" Bulletin No. F-170-42.

THE SAFETY GRINDING WHEEL & MACHINE COMPANY

SPRINGFIELD, OHIO

Sales Offices in Principal Cities

Wire Ropes Safer If Ends Brazed

By F. L. SPANGLER

Where clip fastenings or other means of attachment are used that expose the end of a wire rope, there is constant danger that those handling the rope might receive lacerations or puncture wounds from the sharp wires at the rope end. This form of injury is said by some medical authorities as being especially dangerous since it is likely to be deep seated, and the injured man might consider the wound as too superficial to require immediate attention.

It is not uncommon for blood poisoning to develop from such wounds where immediate treatment is not given. And now that we need every ounce of production energy—this is no time to have workmen laid up because of injury.

A simple method of eliminating the hazard of sharp exposed rope ends is to braze the end of the rope with a bronze welding rod, running the bronze back for a distance of an inch or two from the end. When properly done, the bronze covers all the wire ends, and it also has the advantage of holding the rope end intact so that seizing can be removed.

Ends of preferred ropes can be brazed without applying a seizing beforehand, since preforming removes all unbalanced stresses in the rope wires and strands so all wires hold their position in the rope without the need for using seizings. Even so, a single seizing will insure that the rope construction will not be flattened during the cutting operation. If the rope is not preformed, it is recommended that two or three seizings be applied—one close to the end of the rope and the others a short distance (4 to 6 inches) apart.

PROTECT YOUR WORKERS NOW
AGAINST THE
MAJOR CAUSE* OF ALL
OCCUPATIONAL DISEASES
WITH M·S·A FEND

BARRIER PROTECTION For the Worker's Skin

In the broad FEND line of industrial creams and lotions, you'll find the right protection against skin irritations encountered in the modern foundry—easy to apply and remove—bland and neutral—medically correct and cosmetically safe to use under all conditions. FEND Creams bar the way to skin rash and soreness—keep your workers safe on-the-job. Write for complete descriptive details!

*Occupational skin infections represent 65% of *all* industrial disease—a menace to production that must and can be eliminated!

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS
PITTSBURGH, PA.

Corn Situation Hits Core Binder Supply

A threat to the successful handling of certain foundry operations is contained in the announcement of the corn refining industry that because of diminishing corn supplies it may become necessary within a month to shut down the dozen or more plants now producing starch used as a core binder, as well as other corn products.

Cause of the situation is the almost complete stoppage of corn shipments to the terminal markets of the country, and is said to be the unexpected result of the corn-hog policies initiated by the Secretary of Agriculture some time ago, weather conditions being only a minor incident in the situation.

In an effort to stimulate livestock production, high selling prices were guaranteed for hogs, and price ceilings were set on corn with the result that the farmers of the corn belt plunged on swine production, the marketing of corn in the form of pork proving highly profitable. Accordingly, the swine census is now almost double the figures of normal years—and there is little or no corn for other corn users.

Book Review

Technical Handbook, by Edward H. Lang, supervisor of industrial education, New York State Education Department, paper, 110 pages 5 x 8 inches, published by Prentice-Hall Inc., New York, price, $1.

This book covers the application of mathematics and science to the industrial job, with essential tables for shop or engineering use and includes use of slide rule, logarithmic and trigonometric tables, reference tables on materials of industry, English-metric conversion, squares and square roots, cubes and cube roots, methods of solving problems. The present work brings together tables of data, conversion factors and related information to supplement text books in these fields of work and has been designed to assist in the training of graduates of vocational schools. Problems and systematic solutions are emphasized because an important element of many industrial positions is the ability to express ideas with figures and diagrams.

10"—32" Adams Jolt Squeezer, Portable Type

To Meet Production Schedules—
Use Adams Jolt Squeezers

They Will Reduce Production Costs. They are efficiently designed with a minimum number of working parts, and controls are accessible for quick handling.

They Will Assist in Reducing Losses. Close control of jolting and squeezing operations assures the production of uniform molds.

They Will Help to Maintain Uninterrupted Production. Simple design and durable construction provide insurance against production delays.

They Solve the Skilled Labor Shortage. Their operation has been so simplified that no special skill is required to operate them successfully.

The Adams Company, 700 FOSTER STREET DUBUQUE, IOWA

1883 — *Our 60th Year* — 1943

MOLDING MACHINES **ADAMS** FLASK EQUIPMENT

Activities of FOUNDRY GROUPS

Southern California

AN EXHIBIT of patterns, cores and castings made by the students of the foundry class conducted at the Fullerton High School, Fullerton, Calif., and taught by Ralph Wertz, was featured at the April 22 meeting of the Southern California Chapter of the A.F.A., held at the Elks Club, Los Angeles. Earl Anderson, president of the chapter, called upon Mr. Wertz to discuss the highlights of his instruction course. Mr. Wertz explained that the co-operation of the American Foundrymen's Association was responsible for much of the good work of the students.

Principal speaker of the evening was John Wilson, representative of the Climax Molybdenum Co., who discussed "Metallurgy of Modern Cast Iron". Mr. Wilson spoke on foundry practice prevailing in the community and covered improvements made by the industry in general in raising the physical properties of cast iron by controlled and correct melting practice, pouring temperature, ladle inoculations and judicious use of alloys. Using slides to emphasize various points of his talk, he graphically showed the effects of alloying cast iron.

Through the courtesy of the Aluminum Co. of America, the motion picture, "How to Weld Aluminum" was shown.

May meeting of the Southern California Chapter was held at the Elks Club, Los Angeles, May 20. Delegates from the chapter to the St. Louis convention gave their reports and the meeting was then turned over to A. W. Gregg, Whiting Corp., Harvey, Ill., who presented an interesting talk on "Melting Steel by the Triplex Method". Mr. Gregg has addressed the chapter on several occasions and his return visit was greatly appreciated.

Many questions pertaining to local problems were discussed after his talk. The motion picture, "The World at War", was shown at the meeting. It consists of films taken from American news reels of enemy zones now in custody of the United States government.—*E. M. Hagener, secretary.*

Speakers' table at the recent Old Timer's and Apprentice Night party of the Wisconsin Chapter of the A.F.A. Seated, left to right: William Watson Sr.; C. E. Hoyt, American Foundrymen's Association; M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill.; George K. Dreher, Ampco Metal Inc., Milwaukee, and president of the Wisconsin Chapter. Standing is William A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee

Philadelphia

MEETING of the Philadelphia Chapter of the A.F.A. held at the Engineers Club Philadelphia, May 14, was the final session of the current season. It served the double purpose of winding up the season and affording members and friends an hour of entertainment arranged by the chairman of the entertainment committee, John M. Robb.

Technical session was dispensed with and that part of the evening was taken over by an interesting and inspiring talk entitled, "Challenge to American Citizenship," given by Rev. Imre Kovacs. Rev. Kovacs is a native of Hungary but he was educated in this country. In his talk he pointed out the great advantages of being an American. He said that he intends to return to his native country at the first opportunity when final victory is won and explain to his people the advantages of a democracy such as we are blessed with in this country.

Following this talk 150 members and guests enjoyed one of the finest floor shows presented by the chapter and partook of beer and pretzels supplied by the association. At a previous meeting of the chapter's board of directors, the following officers were elected for the 1943-44 season: Chairman, B. H. Bartells, University of Pennsylvania, Philadelphia; vice chairman, Robert Latham, Bethlehem Steel Co.; secretary-treasurer, W. B. Coleman, W. B. Coleman & Co. Directors elected to serve for 3 years: James March, Schneider Bowman Co. Inc.; E. C. Troy, Dodge Steel Co.; William S. Thomas, North Bros. Mfg. Co.—*William S. Thomas, chairman, publicity committee.*

Cincinnati

FOUNDRY dust control was the topic featured at the May 10 meeting of the Cincinnati District Chapter of the A.F.A. held at the Cincinnati Club. Chairman Frank E. Hutchinson, Reliance Foundry Co., Cincinnati presided. Mention was made of the success of the recent St. Louis convention of the A.F.A. in which various Cincinnati Chapter members participated. Ed King, Hill & Griffith Co., program chairman, introduced the speaker, John M. Kane, American Air Filter Co., Louisville, Ky., Mr. Kane stated there seems to be increas-

ing recognition by foundrymen that they must clean up their foundries, and he outlined how they are doing it. Mr. Kane presented a series of slides illustrating dust particles and the relation of small particles to the hazard. Following a general description, he illustrated some methods of collecting dust from shakeout of small parts, and from large castings, also from elevators, belts, mullers and cleaning room.—*Henry M. Wood, secretary.*

Quad-City

ELECTION of officers was held at the May 17 meeting of the Quad-City Chapter of the A.F.A. held at the LeClaire Hotel, Moline, Ill. Sixty-three members and guests were in attendance, with A. D. Matheson, French & Hecht Inc., Davenport, Iowa, presiding. A permanent entertainment advisory committee was named with the following members: A. E. Hageboeck, Frank

LAWRENCE KINSINGER, winner of the A.F.A. gray iron molding contest for apprentices, as announced at the St. Louis convention. A native of Washington, Ill., and formerly an apprentice with Caterpillar Tractor Co., Peoria, Ill., he is now with the armed forces

Foundries Corp., Moline, Ill.; C. H. Burgston, Deere & Co., Moline, Ill.; A. H. Putman, A. H. Putman Co., Rock Island, Ill., and the current chairman of the entetrtainment committee.

Officers elected for the next year are: Chairman, W. E. Jones, Ordnance Steel Foundry Co., Bettendorf, Iowa; vice chairman, R. E. Wilkie, Deere & Co., Moline, Ill.; secretary-treasurer, H. L. Creps, Frank Foundries Corp., Moline. Directors elected to serve 3 years: A. D. Matheson, French & Hecht Inc., Davenport, Iowa; M. H. Liedtke, International Harvester Co., Rock Island, Ill.; C. S. Humphrey, C. S. Humphrey Co., Moline, Ill. C. E. Von Luhrte, Chicago Retort Co., Davenport, Iowa, was elected a director to serve 2 years, and Haydn Laycock, F. B. Stevens Inc., Peoria, Ill., was elected to serve 1 year.

Principal speaker was Carl H. Morken, Carondelet Foundry Co., St. Louis, and technical consultant in the engineering

● Wherever you find a Chicago Mounted Wheel at work, you'll find 100% grinding speed and efficiency.

Mounted firmly on its own steel shank, each wheel is a whirling point of easily controlled power that cuts valuable man hours. Jobs are completed so speedily that bottlenecks due to slow finishing of castings and other vitally needed parts are removed. Work is so smooth that rejections are practically nil.

Available in 300 shapes and sizes—every grade and grain—a best wheel for every job.

TEST WHEEL FREE Tell us kind of job, type grinder you use and size wheel you'd like and we'll send one postpaid for you to try.

AMERICA'S HEADQUARTERS FOR MOUNTED WHEELS SMALL GRINDING WHEELS

★ Half a century of specialization has established our reputation as the small wheel people of the abrasive industry

PROMPT DELIVERY

With WPB approval and endorsement, we stopped making all wheels larger than 3" in diameter. By specializing* on Mounted Points and Grinding Wheels 3" and under in diameter, 24 hours a day, we have stepped up production and are keeping up with demand. Our central location is another big advantage—no time is lost between our production line and yours.

NEW CATALOG — Shows Chicago Mounted Wheels in actual colors, also portable electric tools and time-saving accessories.

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☐ Free Wheel. Size.....
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SIMPLICITY OF DESIGN . . . AN OUTSTANDING FEATURE

The fewer moving or wearing parts that make up any piece of equipment, the more continuous service at the lowest operating cost. Fuller Rotary Compressors and Vacuum Pumps are an outstanding example of simplicity of design . . . only three moving parts: rotor, bearings, blades.

Ruggedly constructed, they will withstand long, continuous service and, after severe, gruelling operating periods, if inspection and check-up is desired, the machine design permits doing this easily and with a minimum loss of time.

Shut-downs are costly . . . lost time can never be recovered . . . install Fullers for day in and day out, continuous service.

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FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

section of the Ordnance Department, who spoke on "Cast Iron Ordnance Material". Mr. Morken discussed his experience in working with the Ordnance Department and reviewed the efforts which have been made to use more cast iron in tanks, combat vehicles, small arms, artillery and ammunition. He stated that because of the shattering characteristics of iron, most ordnance department engineers specified other material for use in their work. He gave a report of many tests which have been made in an attempt to find wider usage for cast iron. A lively discussion period followed Mr. Morken's address.—*H. C. Creps, secretary-treasurer.*

Birmingham

FINAL meeting of the current season for the Birmingham District Chapter of the A.F.A. was held May 21. In the absence of Chairman E. A. Thomas, W. Carson Adams, vice chairman of the chapter, presided.

The meeting featured an interesting and instructive paper by Charles K. Donoho, metallurgist, American Cast Iron Pipe Co., Birmingham, on "Casting Steel Centrifugally." The speaker went into the subject in detail and the process was illustrated by the use of slides picturing the work and equipment used in carrying on that class of casting in the American Cast Iron Pipe plant. Mr. Donoho answered a number of questions from the floor at the conclusion of his talk.

J. A. Bowers, chairman of the nominating committee, presented the names of W. Carson Adams, Carson Adams Coal & Coke Co., as chairman; R. L. Ogden, Stockham Pipe Fittings Co., vice chairman and Howard A. Nelson, Hill & Griffith Co., secretary-treasurer. There being no further nominations, the secretary cast the vote of the meeting electing those gentlemen to their respective offices. A. E. Thomas, Thomas Foundries; R. A. Donaldson, Woodward Iron Co., and R. R. Deas, American Cast Iron Pipe Co. were elected directors.—*H. B. McLaurine, reporter.*

Western Michigan

ONE hundred and fourteen members and guests were present at the May 10 meeting of the Western Michigan Chapter of the A.F.A. The following officers were elected: Chairman, H. C. BeMent, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; vice chairman, A. E. Jacobson, Grand Haven Brass Co., Grand Haven, Mich.; secretary, C. H. Cousineau, West Michigan Steel Foundry Co., Muskegon, Mich.; treasurer, F. C. McCarthy, Wolverine Brass Co., Grand Rapids, Mich. The following directors were elected to serve a three-year period: H. N. Meyers, Sealed Power Corp., Muskegon, Mich.; R. W. Hathaway, Federal Mogul Co., Greenville, Mich.; H. J. Krause, Newaygo Engineering Co., Newaygo, Mich. C. J. Lonnee, Muskegon Piston Ring Co., Sparta, Mich., was elected to serve as director for one year.

Humorous entertainment for the evening was provided by Lyman Cooley and Gordon Kibbee, radio entertainers.

Paul S. Lane, Muskegon Piston Ring Co., Muskegon, spoke on the timely and interesting subject, "Military Engines". Mr. Lane described briefly many different types of engines used in the war and the conditions under which they must be used. Especially interesting were the conditions described in desert warfare where fine sand is encountered by aircraft at heights of 10,000 feet. This was the final meeting of the current year.—*K. C. McCready, secretary.*

Reading

REGULAR meeting of the Reading Foundrymen's Association was held at the Berkshire Hotel, Reading, Pa., May 18, with approximately 275 members and guests present. H. P. Good, president of the association, presided. The meeting had special significance in that it honored L. C. Wilson, Reading Steel Casting Division, American Chain & Cable Co., Reading, who recently was elected president of the American Foundrymen's Association.

MICHAEL SLIVKA, Hill-Acme Co., Cleveland, winner of third prize in the gray iron molding division of the A.F.A. national apprentice contest, receiving his award at a meeting of the Northeastern Ohio Chapter of the association. James G. Goldie, president-elect of the chapter, made the presentation

Speaker of the evening was E. C. Troy, metallurgist, Dodge Steel Corp., Philadelphia. Mr. Troy stated that the foundry industry had learned much from the war, and that rapid expansion in the post-war era could be anticipated. He stated that plastics will play an ever increasing role in foundry work, replacing wood for pattern making, and that the hazards of temperature will be overcome by such use. He also predicted many new commodities, providing a higher standard of living, will result from the conversion from a wartime industry to peace. "Our metals will find new applications," Mr. Troy said. "We will do more in less time and the trend will be toward labor saving devices."

He then went on to say that foundries will recognize welding as more than a repair function and that in the future castings will be custom built, that new engi-

. . Standard Conveyor Engineers Will be Ready —With Added "Know-How" to Their 35-Year Experience Record—For Conveyor Jobs to Come

The experience record of the Standard Conveyor organization spans a period which includes two world wars.

For more than 35 years Standard Conveyor Company has concentrated on power and gravity conveyors. Such specialization has developed improved design and materials in the conveyors themselves and given Standard Conveyor engineers an invaluable reservoir of practical experience.

Knowing how to apply power and gravity conveyors to best advantage is equally as important as building them well. Its service record with American business and industry attests Standard Conveyor Company's ability to do both.

Write for valuable reference book, "Conveyors by Standard" Catalog F-7.

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ENGINEERED FOR FASTER PRODUCTION

Here's a Double Answer to the *Manpower Shortage..*

+WHEELPOWER
-WHEELCOST

DETAIL	SNAGGING WHEEL TEST	
	CORTLAND	OTHER BRAND
Cost of wheel	$23.43	$23.43
Diam. at start of test	24"	24"
Diam at end of test	22-7/8"	21-1/4"
Cu. in. in a 24" wheel	904.78	904.78
Cu. in. used	82.44	195.48
Cost per cu. in. usable material	$ 0.026	$ 0.026
Cost of cu. in. used	$ 2.14	$ 5.08
Weight of castings before grinding	4910.5	6998
Weight of castings after grinding	4809.5	6895
Pounds of metal removed	101	103
Total working hours	9-1/2	9-1/2
Pounds of metal removed per hour	10.62	10.84
Cu. in. wheel wear per hour	8.67	20.57
Wheel cost per hour	$ 0.225	$ 0.518
POUNDS OF METAL REMOVED PER CU. IN.	1.22	.521
WHEEL COST PER POUND OF METAL REMOVED	$ 0.021	$ 0.049
Wheel dressings	Low	Low
Operators opinion of wheels	Good	Do not like

Why sacrifice the wheel to get the work out? Why not let Cortland show you what "Plus Wheelpower — minus Wheelcost" can do for your snagging? A Cortland Engineer will help you select a Cortland Wheel to do a bigger job . . . all 'round.

For Better Snagging

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neering concepts are in the making and that in the airplane industry alone in the postwar period a market for between 6000 and 10,000 tons of castings a month may be anticipated. The speaker urged those present "not to let new developments get out of hand, but to use them to control your products". He warned that the foundry that will survive will be the one that knows what is wanted and can become production and precision minded.

Brief remarks were made by Mr. Wilson and by Marshall E. Post, general manager, Birdsboro Steel Foundry & Machine Co., and a past president of the American Foundrymen's Association. The meeting was concluded with an hour of entertainment.—*H. C. Cummings, secretary.*

New England

EIGHTY members and guests of the New England Foundrymen's Association met June 9 at the Engineers' Club, Boston, for the regular meeting of the organization. C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., was the principal speaker, and Augustus W. Calder, New England Butt Co., Providence, R. I., and president of the association, presided.

Mr. Bales' subject was "Conservation of Foundry Refractories". He stated that refractories are better today than they were during World War I due to better methods of manufacture and more exact scientific knowledge employed in operation of the brick plants. In discussing longer life of cupola brick, the speaker took up in detail the essential things to be watched. He recommended use of a double lining 9 x 6 x 4-inch blocks to the charging door, and showed how the proper patching of a cupola is essential to economical cupola operation, pointing out that patching or daubing mud should be carefully selected and the mixture of materials should be such as to preserve and protect the lining.

In making up the daubing compound, two materials of high fusion points, if mixed in certain proportions, may produce a patching mixture which will melt at a temperature lower than either of the constituents. Scoring in the melting zone should be even and clearly defined in good operation. Uneven scoring indicates poor operation or improper patching.

Correct amount of air under proper pressure is obviously essential. Cupola charge in itself may play an important part in brick lift. Careful charging will prolong the life of refractories. In reference to slag, Mr. Bales pointed out that slag should never be permitted to become sticky or gummy, but should be fluid all the time and removed promptly. Slag holes should not be allowed to become too large. More brick is consumed from poor slagging than from almost any other reason. A bluish, foamy slag, commonly found where considerable steel is used in the cupola charge, indicates damage being done to the brick

work. Small amount of fused soda ash in the flux mixture is commonly considered good practice. A question and answer period followed the talk.—*Merton A. Hosmer.*

Northern California

A SPECIAL meeting of the Northern California Chapter of the A.F.A. was called April 30 at the Leamington Hotel, Oakland, Calif. Harry A. Bossi, vice president of the chapter presided in the absence of F. A. Mainzer, president, who was in St. Louis attending the annual convention of the A.F.A.

Serge P. Kovaleff, program chairman, introduced the speaker, A. A. Turner, refractory engineer, Carborundum Co., Perth Amboy, N. J., whose subject was "Refractory Materials". He stated that the Carborundum Co. has been interested in the development of super refractories as well as in abrasive products. Development of the former, on a large scale, has taken place in the past 20 years simultaneous with the rapid progress made during the same period by the producers of clay, silica and basic refractories. He added that modern metallurgy is dependent upon improvement both in regular and super refractories.

Mr. Turner showed some films taken in the course of developing newer types of fused cast refractories, pointing out that while the subject matter of the films was not directly applicable to foundry problems, it was exemplary of the type of technique used to determine solutions to the refractory problems confronting industry. One portion of the film was devoted to moving pictures taken at temperatures varying from 2000 degrees Fahr. to 3000 degrees Fahr., showing the attack of slags and glasses on the specimens tested.

Featured speaker at the May 21 meeting of the Northern California Chapter of the A.F.A. held at the Engineers Club, San Francisco, was A. W. Gregg, Whiting Corp., Harvey, Ill. Vice President Harry A. Bossi, presided in the absence of F. A. Mainzer, and there were 96 members and guests present. President Mainzer had furnished a written report of his impressions of the A.F.A. annual convention. Charles J. P. Hoehn, chairman of the nominating committee, presented the report of that committee for officers and directors for the coming year which was as follows: President, Harry A. Bossi, H. C. Macaulay Foundry Co., Berkeley; vice president, R. C. Noah, San Francisco Iron Foundry, (formerly S. F. Stove Works); secretary-treasurer, George L. Kennard, Northern California Foundrymen's Institute. Director to serve one year, A. R. Linn, Joshua Hendy Iron Works; and to serve two years, M. W. Hulst, General Metals Corp., Oakland, and R. W. Goldwater, Industrial Supply Co., San Francisco.

Serge Kovaleff then introduced Mr. Gregg, whose talk was on "Steel Melting Methods" a subject of great interest to his audience. The talk was illustrated with slides and a movie film. The

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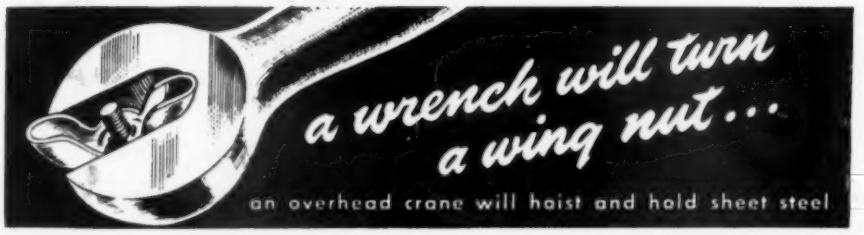

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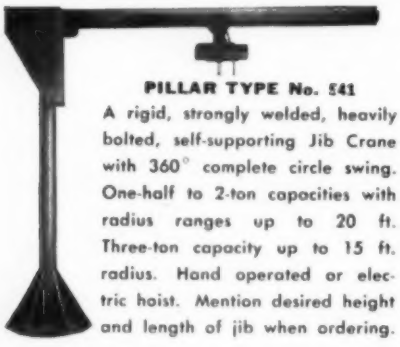

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proof that a good subject was well covered was demonstrated by the number of questions asked and the discussion which followed extended well after regular adjournment time.—*George L. Kennard, secretary-treasurer.*

Ontario

A VERY successful group meeting of the Ontario Chapter of the A.F.A. was held at the Royal Connaught Hotel, Hamilton, Ont., March 26, with gray iron, nonferrous and malleable discussion groups.

In the gray iron section, under Chairman C. O. Williamson, Grinnell Co. of Canada Ltd., a talk was given by W. J. Brill, Canadian General Electric Co. Ltd., Toronto, on "High Test Cast Iron." Mr. Brill outlined his company's practice in the production of a high test iron known as Electrite. Melting practice in the cupola was described and spout additions were mentioned. Reference was made to the wide variety of parts made in this metal, ranging from about a pound to approximately 8 tons. General foundry practice and the advantages and limitations of high test cast iron were covered. Following the talk by Mr. Brill, there was a general discussion on foundry supplies.

In the nonferrous group meeting, E. G. Jennings, Office of the Metals Controller, Ottawa, took part in the discussion of a variety of problems. Tom Myatt, foundry superintendent, Coulter Copper & Brass Co. Ltd., was the main speaker of the evening, reviewing in detail the difficulties encountered in the solution of two representative nonferrous foundry problems. W. Loehr, Hahn Brass Co. Ltd., brought before the meeting a matchplate problem which proved a real contribution. A. Lawrason, Eureka Foundry & Mfg. Co. Ltd., expressed an opinion on the importance of sand control, particularly where silicon bronze is concerned. A number of others took part in the discussions to round out a very interesting evening.

In the malleable section, under the leadership of J. Cunningham, International Malleable Iron Co. Ltd., Guelph, Ont., Reginald Williams, chief chemist, McKinnon Industries Ltd., St. Catharines, Ont., described the company's experience in duplexing malleable iron for short cycle annealing. Mr. Williams covered raw materials, the cupola, cupola repairs, tap and slag hole blocks, charging, the use of the forehearth, ladles, and electric furnace and its maintenance, metal control and operations, the mix, the use of the electric furnace, chemical analysis, molding lines and annealing furnaces.

The Ontario Chapter closed its season with an entertainment night and business meeting at the roof garden of the Royal York Hotel, May 14. The interest which this annual event has aroused may be measured in some degree by the attendance of over 225 members and guests of the chapter.

Principal business of the evening con-

sisted in the announcement of 17 new members by T. D. Barnes, chairman of the membership committee; an outline of the strong financial position of the chapter by G. L. White, secretary-treasurer; and the installation of the new officers for 1943-44 by retiring Chairman, J. J. McFadyen, Galt Malleable Iron Co. Ltd., Galt, Ont.

The following new officers were installed: Chairman, C. C. MacDonald, Frederic B. Stevens Canada Ltd., Toronto; vice chairman, Robert Robertson, International Harvester Co. of Canada Ltd., Hamilton; secretary-treasurer, G. L. White, Westman Publications Ltd., Toronto. Directors elected to serve 3 years: J. Dalby, Canada Metal Co. Ltd., Toronto; G. O. Loach, Otis-Fensom Elevator Co. Ltd., Hamilton; T. Taffel, Standard Sanitary & Dominion Radiator Ltd., Toronto. L. B. Morris, Gurney Foundry Co. Ltd., Toronto, was elected a director to serve 1 year.

Joe Sully, Sully Brass Foundry Ltd., Toronto, and first chairman of the chapter, outlined the development of the group from its inception in 1938, following the formation of a Canadian section in 1937. Succeeding chairmen were: D. J. McDonald, Standard Sanitary & Dominion Radiator Ltd., Toronto, D. M. Storey, Fittings Ltd., Oshawa; N. B. Clarke, Steel Co. of Canada Ltd., Hamilton; J. J. McFadyen, Galt Malleable Iron Co., Galt. Following a reception, those present enjoyed a turkey dinner and a good floor show under the direction of C. O. Williamson, Grinnell Co. of Canada Ltd., chairman of the entertainment committee.

Much of the success of the meeting must be attributed to approximately 30 companies that donated to the cost of the occasion. While final figures are not available, it is anticipated that the chapter will have a surplus from the meeting of approximately $100 which will be donated to the "Milk for Britain" fund.—*G. L. White, secretary-treasurer.*

Detroit

CONCLUDING a year of unparalleled interest in technical meetings, the Detroit chapter of the A.F.A. convened May 20 at the Rackham building, with the usual four round table discussions following a dinner which drew attendance of 125, while 30 more came in later for discussions.

A joint round table on gray iron and steel featured H. W. Dietert as the discussion leader. Mr. Dietert reviewed the properties of molding sands and showed slides of casting defects, suggesting the causes and remedies from the standpoint of molding practice.

Finishes and finishing methods for aluminum castings drew a large crowd at the aluminum roundtable, E. V. Blackmun, Aluminum Co. of America, Cleveland, leading the discussion.

M. E. Brooks, Dowmetal Foundry,

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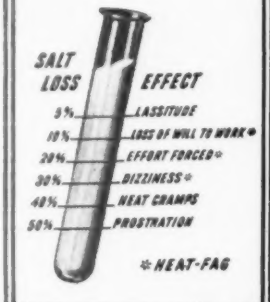

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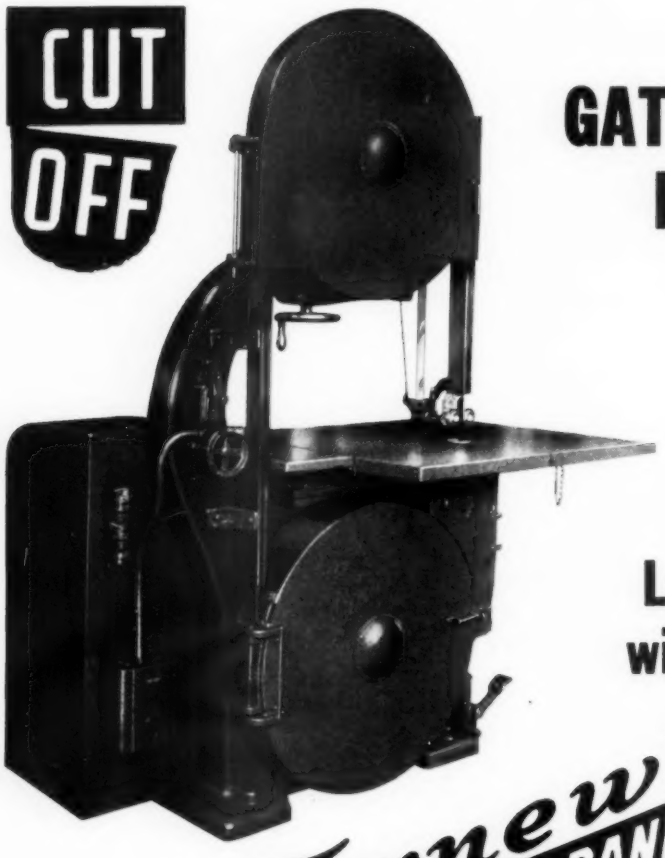
Bay City, Mich., examined the matter of trimming and cleaning magnesium castings and showed several slides illustrating recommended practice.

The brass and bronze roundtable heard Claude Sides, Federal-Mogul Corp., outline his views on the reduction of casting losses in the brass and bronze foundry field. This discussion took the form of a defective castings clinic, to which participants were invited to bring samples of scrapped castings so that causes could be analyzed in detail.

Officers for 1943-44 terms were officially elected as follows:

Chairman, Omer L. Allen, Pontiac Motor Division; vice chairman, R. G. McElwee, Vanadium Corp. of America; treasurer, W. W. Bowring, Frederic B. Stevens Inc.; secretary, A. H. Allen, Penton Publishing Co. New directors include F. A. Melmoth, Detroit Steel Casting Co.; E. R. Darby, Federal Mogul Corp.; A. W. Stolzenburg, Aluminum Co. of America; O. F. Carpenter, Packard Motor Car Co.—*A. H. Allen, secretary.*

Louis G. Tarantino, representative of the Niagara Falls Smelting & Refining Corp. has changed his address from 670 West Jackson Avenue, Bridgeport, Conn. ,to 166 Cold Spring Street, New Haven, Conn.



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Foundry Activities

RACINE Aluminum & Brass Foundry, Racine, Wis., has been purchased by Arthur R. Tooman from William B. Olle. The organization will continue to operate under the same name.

° ° °

Dietert's Foundry, Cherryville, Pa., C. L. Dietert, general superintendent, will build a foundry unit to cost $40,000.

° ° °

Frank J. Novak Foundry Co., has moved from 1545 Temple Avenue, Detroit, to 1435 Michigan Avenue, Detroit.

° ° °

New Haven Malleable Iron Co., New Haven, Conn., is building a foundry addition and an annealing plant.

° ° °

Minot Foundry Co., Minot, N. D., has applied for WPB approval to rebuild its foundry damaged recently by fire.

° ° °

Fisher Brass Foundry, 5332 Santa Fe Avenue, Los Angeles, has been issued a building permit for construction of a new factory building.

° ° °

R. H. Osbrink Mfg. Co., 1412 East Sixty-second Avenue, Los Angeles, is building an addition to its foundry building located at 6917 McKinley Avenue.

° ° °

Wellman Bronze & Aluminum Co., 6017 Superior Avenue, Cleveland, is building a one-story storage building. H. G. Slatmyer & Son Co. is contractor.

° ° °

Prier Brass Mfg. Co., Fifteenth Street and Blue River, Kansas City, Mo., is building a plant to allow rearrangement of its foundry department and new pattern storage vault.

° ° °

Henry Furnace & Foundry Co., 340 Medina street, Medina, O., has been purchased by Leonard Roof, Cleveland; Thomas Kaplin, Toledo, O., Jay Levine, New York. Herbert F. Bradway has been retained as manager.

° ° °

Index of new foundry equipment orders for April, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 297.7 as compared with 538.6 in March. Index for repairs was 558.7. Index of 100 represents the monthly sales to metalworking industries during 1937-38-39.

Suggestions to buyers of nonferrous castings as to the correct procedure in placing purchase orders under the Controlled Materials Plan, have been compiled in a folder by the Non-Ferrous Founders' Society, 111 West Washington Street, Chicago. The digest was prepared by the Washington contacts committee of the society and checked by WPB. Copies are available at a nominal charge.

Obituary

GEORGE L. GRIMES, 67, owner of Grimes Molding Machine Co., Detroit, died in that city May 28. Mr. Grimes was born in Mansfield, O., and attended public schools at Moline, Ill. He entered the University of Illinois by examination after completion of 2 years in high school, and was graduated with a bachelor of science degree in mechanical engineering in 1897. He also received his masters degree from the University of Illinois in 1901. For 1 year he was in charge of the physical laboratory and shops of the University of Iowa, and was instructor in mechanical engineering from 1898 to 1900 at the University of Michigan. Mr. Grimes served as pattern engineer with the National Tube Co., Kewanee, Ill., for 4 years after which he was connected with the Detroit Stoker & Foundry Co., Detroit, as superintendent for 4 years. In 1909 he organized the Grimes Molding Machine Co. to manufacture molding machines which he had designed. He has been active in foundry organizations, being a member of the American Foundrymen's Association, Foundry Equipment Manufacturers Association and the Engineering Society of Detroit.

° ° °

John D. Spicer, 60, for 27 years purchasing agent, American Foundry Co., Indianapolis, died in that city, May 21.

° ° °

Louis K. Brown, 77, producer of molding sand, Zanesville, O., died recently at his son's home in Los Angeles.

° ° °

Edward H. Bardes, 76, founder of the E. H. Bardes Range & Foundry Co., Cincinnati, died recently in Cincinnati.

° ° °

Brig. Gen. Lyman Parsons Hubbell, 68, former president, Fillmore Avenue Foundry & Iron Works Inc., Buffalo, died May 21 in that city.

° ° °

George H. Chisholm, 74, president, Atlas Steel Casting Co., Buffalo, died May 10 in that city. Mr. Chisholm founded the company 32 years ago.

° ° °

L. D. Burr, former assistant secretary and treasurer, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., died in Birmingham, May 18.

° ° °

William L. Krodel, 72, founder, general manager and secretary, Krodel Foundry Inc., Waterbury, Conn., died June 3 at Millville, Conn.

° ° °

Robert E. Brown, 46, Pacific coast division manager, Electro Metallurgical Sales Corp., New York, died May 26, at Belmont, Calif. Mr. Brown first joined the Union Carbide & Carbon Corp. in 1920. He was appointed to his present position in 1940 and in addition was district sales manager, electrode division, National Carbon Co. Mr. Brown was a graduate of Lehigh University.

° ° °

Harry Glaenzer, 67, former vice president in charge of engineering, Baldwin Locomotive Works, Eddystone, Pa., died May 24 at Conshohocken, Pa. Mr. Glaenzer retired from the company in 1940.

° ° °

Thomas C. Holbert, 74, president, Caldwell & Ward Brass Co., Syracuse, N. Y., died May 3 while visiting in Chicago. Mr. Holbert was widely known in the brass foundry industry, having been active in that line for more than 40 years.

° ° °

Fred W. Venton, 61, who retired in 1942 as head of the railroad sales department, Crane Co., Chicago, and since that time had been treasurer, Allied Railway Supply Association, died May 25 in Chicago. His service with Crane Co. started in 1910.

° ° °

Frank H. Smith, 77, who retired in 1936 as western division manager in Chicago of Magnus Co. Inc., now the

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Magnus Metal Corp., a division of National Lead Co., died May 22 in Sarasota, Fla. He had been associated with the company 50 years.

* * *

Herman J. Trenkamp, 78, secretary and director of Ohio Foundry Co., Cleveland, died May 27 at his home in that city. He was formerly associated with his brothers in the Trenkamp Stove Co., of which his father had been one of the founders and owners. A son, Henry J. Trenkamp, is assistant treasurer in charge of sales for Ohio Foundry Co.

William G. Rudd, 55, vice president, Peoples Gas Light & Coke Co., Chicago, died suddenly May 26 in that city. He had been associated with the company 38 years, having started as a laborer but rising through the operating end of the business. A year ago he was named a member of the Solid Fuels Advisory War Council.

* * *

Luke U. Milward, 55, president, Electro Refractories & Alloys Corp., Buffalo, died in Buffalo, June 9. Mr. Milward was born in Lexington, Ky., and his first business connection was with the Anchor Packing Co., Pittsburgh. He was sent to Buffalo in 1913 as district sales manager for that organization, and in 1919 he organized the Electro Refractories & Alloys Corp.

* * *

Walter M. Pomroy, purchasing agent of the Dunkirk Radiator Corp., Dunkirk, N. Y., died unexpectedly at his home in that city June 4 from a heart attack. Born in 1901 in Big Soldier, Pa., he moved at an early age to Dunkirk, receiving his first industrial training there in the brass foundry of American Locomotive Co. Mr. Pomroy became associated with the Dunkirk Radiator Corp. when it began operations in 1929.

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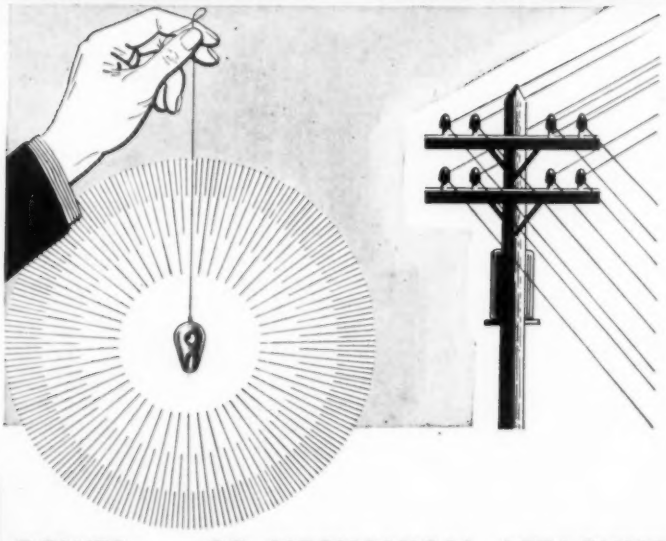

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Zinc Base Dies

(*Concluded from page* 144)

cent causes a loss of one-third of the tensile strength and 75 per cent of the impact strength in one year of normal indoor aging. That amount of lead also will result in expansion of the dies of ⅛-inch per foot in the same period. Presence of iron greater than 0.25 per cent produces peculiar defects on the vertical walls of castings which are termed "dural bug" marks. Hence, care should be taken to protect the kettle and all iron tools used in melting from attack of the molten zinc-base alloy. Some of the iron can be removed as an iron-aluminum compound by holding the alloy at 775 degrees Fahr. for an hour and then skimming carefully.

In remelting, especially if borings or other finely divided scrap is to be treated, a few pounds per ton of a flux composed of 50-50 mixture of sal-ammoniac and zinc chloride or some proprietary material will serve. Use of flux necessitates use of hoods over the furnaces due to the heavy fumes created. After stirring in the flux, the metal should lie quietly at 775 degrees for 20 or 30 minutes to permit the dross to rise to the surface. The dross is skimmed with as little disturbance as possible.

This view shows a number of dies made from zinc-base alloy for making aircraft parts. Photo courtesy Lockheed Aircraft Corp., Burbank, Calif.

Issues Emergency Specifications

In accordance with a special procedure the American Society for Testing Materials is issuing emergency alternate provisions in the interest of expediting procurement or conservation of materials during the national emergency. They are intended for use where they may be considered by the purchaser of the material as a permissible alternate for the specific applications or use desired The most recently issued as of April 27, is EA-A148a which supersedes one previously issued on Feb. 24, 1942. The new provisions are as follows:

EA-148a

The following emergency Alternate Provisions, when specified, may be used as an alternate in A.S.T.M. Standard Specifications for Alloy-Steel Castings for Structural Purposes (A148-42) and affect only the requirements referred to:

Section 1.—Change the references to class B and class C to read as follows:

Class EB.—Castings of one grade, which may be normalized, or normalized and tempered, or drawn (Note 2).

Class EC.—Castings of three grades, which may be liquid quenched and tempered or drawn (Note 3).

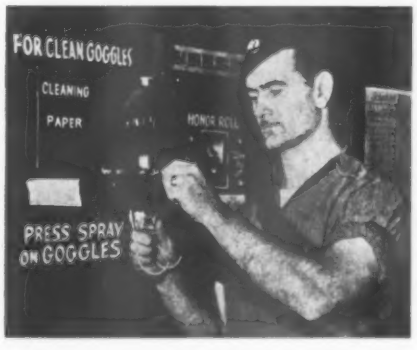
Table I.—Change to read as shown in the accompanying table.

Alternate Specifications for Alloy Steel Castings

Class		Tensile Strength min., spi.	Yield Point min., psi.	Elong. in 2 in., min., per cent	Red. of Area min., per cent
		Regular Grades			
Class A	Grade 1	75,000	40,000	24	35
	Grade 2	85,000	53,000	22	35
		Emergency Grades			
Class EB	Grade 3	100,000	65,000	17	30
Class EC	Grade 4	105,000	85,000	15	30
	Grade 2	120,000	100,000	12	25
	Grade 3	150,000	125,000	10	20

Service Station Aids Goggle Cleaning

To encourage workers to clean their goggles frequently, Sharon Works of Westinghouse Electric & Mfg. Co. has installed conveniently located soap and



paper dispensers. A drop or two of the cleaning solution and a piece of paper quickly does the job. Cleaning stations consist simply of standard type dispensers for the solution and paper, both mounted on a board with a prominent identifying sign.

Four manuals on the Wagner labor relations act, the Walsh-Healy public contracts act, wages and hours act, and on collective bargaining, prepared by the National Foremen's Institute, Deep River, Conn., have been revised and reprinted. The revised editions were printed after it had been determined no changes would be made in the law during this session of congress.

AS GOOD AS THE FIRS... *always the same*

Exact duplication of "that last order" is tremendously important under present conditions. The carefully guarded UNIFORM QUALITY of DAYTON OILS has not varied for nineteen years. It will not vary. Can you afford less? Write today for full information.

THE DAYTON OIL COMPANY • DAYTON, OHIO

MAKERS OF DOCO BINDER & CORE PASTE • DOCO STEEL CORE & MOLD WASH

WASHINGTON NOTES ★ ★ ★ ★

WHO says the farmer isn't getting a break? Businessmen who have waded through the more wordy of the seemingly endless flow of regulations issued by WPB and OPA would have cause for wondering after browsing through Priorities Regulation 19 issued recently by WPB. It applies to procurement of farm supplies and is a masterpiece of simplicity. For once the verbiage so dear to the heart of Washington lawyers has been omitted, and an easily understood document is the result.

★ ★ ★

Regulation 19 starts out with the following homely phrase: "This regulation tells how a farmer gets a priority to buy farm supplies from a dealer and how a dealer gets a priority to maintain his stock of farm supplies." The certification a farmer uses in buying supplies is equally concise, as follows: "I certify to the War Production Board that I am a farmer and that the supplies covered by this order are needed now and will be used for the operation of a farm." Unfortunately, there is no indication that this signalizes a change in policy on the part of those responsible for the verbosity of most orders and regulations.

★ ★ ★

CSP is another alphabetical combination of significance in the war production pattern. It means Component Scheduling Procedure and is intended to correct maldistribution of orders, inadequacies in the priorities system, unrealistic delivery requirements and failure to place orders well in advance. This would make it appear to be a super CMP, but actually it will operate selectively rather than generally. Initially it will be concerned with only certain components for the following programs and projects: Ships; tanks, combat vehicles and motor transport vehicles; power generating plants; and plants for production of rubber, high octane gasoline, aluminum, magnesium and steel.

★ ★ ★

CSP is intended to be a means whereby delivery of various specified components and sub-components will not be delayed so as to hold up the program or project in question. Form PD-903 is the instrument for implementing the procedure. It identifies the program into which the sub-component goes and establishes a schedule of delivery requirements in harmony with the manufacturing schedule of the program. It also makes it possible for the WPB industry division to make adjustments in scheduling when bottlenecks appear in prospect. Contractors, whether prime, sub or sub-sub, who place orders for sub-components to be used in any CSP program or project present the manufacturer of their required sub-components with a PD-903 form, only if instructed to do so by the person furnishing the form.

★ ★ ★

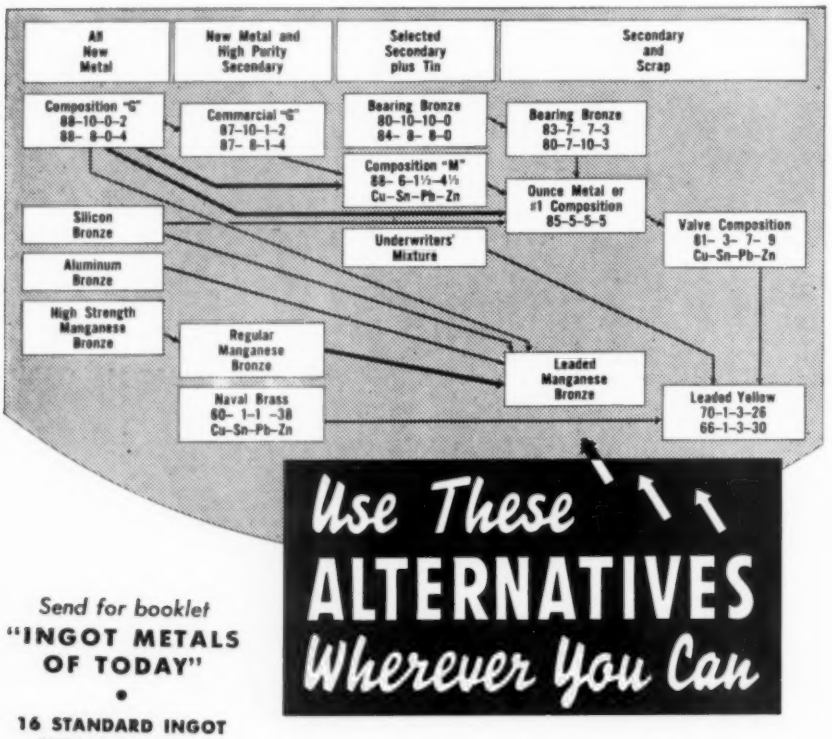
ESTABLISHMENT of combination apprenticeship and high school systems in every war production area is proposed by state apprenticeship directors. The plan gives boys an opportunity to obtain a high school diploma and at the same time receive practical plant experience.

★ ★ ★

Two new tests are being applied by WPB regional offices before approving priority ratings assigned by officers of the Army, Navy or other government agency for delivery of machine tools or capital equipment valued at more than $500. These are: (1) the item requested must be required urgently, and (2) no suitable second-hand equipment or subcontracting facilities are available.

★ ★ ★

LABOR-MANAGEMENT production committees have received more than 600,000


All New Metal
New Metal and High Purity Secondary
Selected Secondary plus Tin
Secondary and Scrap
Composition "G" 88-10-0-2 88- 8-0-4
Commercial "G" 87-10-1-2 87- 8-1-4
Bearing Bronze 80-10-10-0 84- 8- 8-0
Bearing Bronze 83-7- 7-3 80-7-10-3
Composition "M" 88- 6-1½-4½ Cu-Sn-Pb-Zn
Ounce Metal or #1 Composition 85-5-5-5
Silicon Bronze
Aluminum Bronze
High Strength Manganese Bronze
Underwriters' Mixture
Valve Composition 81- 3- 7- 9 Cu-Sn-Pb-Zn
Regular Manganese Bronze
Leaded Manganese Bronze
Naval Brass 60- 1-1 -38 Cu-Sn-Pb-Zn
Leaded Yellow 70-1-3-26 66-1-3-30

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ALTERNATIVES
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Ajax Golden Glow Yellow Brass
Ajax-Hamilton Gear Bronze
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

THE AJAX METAL COMPANY
ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES:
AJAX ELECTRIC FURNACE CORP. Ajax-Wyatt Induction Furnaces for Melting
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suggestions from workers since inauguration of the war production drive a little more than a year ago. Man-hours and quantities of critical materials saved as a result of these suggestions run to large figures.

★ ★ ★

Revision of the order governing manufacture and distribution of oxy-acetylene apparatus adds hose clamps to the list of parts in which use of nonferrous metals or stainless steel is prohibited. However, these materials now may be used for torch handle casings which serve as conveyors of gas, also for electroplating or coating various specified parts.

★ ★ ★

USE OF allotment numbers as an uprating device for obtaining non-controlled materials under CMP expired June 30. For example, an order placed in June with a rating of AA-2X to which an allotment number is applied in July, and an order placed in July with a rating of AA-2X and bearing an allotment number, will both be deemed equal in rating to orders rated AA-2X to which no allotment number or symbol is applied.

■ **CMP REGULATION 5: Rules affecting purchase of maintenance, repair and operating supplies have been revised. The AA-2X rating formerly assigned for MRO purchases by persons engaged in activities listed in Schedule II of the regulation, becomes AA-2. Schedule I activities still command AA-1 rating, while the A-10 rating previously available to persons engaged in businesses not listed in either Schedules I or II, has been raised to AA-5. However, MRO ratings may not be used for delivery of certain materials for which specific ratings have been assigned under an order of the "E", "L" or "M" series.**

Schedules I and II of the regulation have been completely revised, although ferrous and nonferrous foundries and most manufacturers of foundry equipment remain in Schedule I, entitling them to use a rating of AA-1 in purchasing MRO supplies.

The MRO procedure may be used for capital additions costing not over $500, excluding the buyer's labor cost, but authorization must be obtained if construction is involved. MRO quarterly purchases are limited to 25 per cent of 1942 purchases, except for businesses which are seasonal or were not operating in 1942. Quantity restrictions do not apply to companies whose MRO purchases are less than $5000 a year. The 60-day inventory restrictions of CMP Regulation 2 apply to MRO.

Serious delays in movement and delivery of bulk commodities by rail threaten to occur during 1943 as the result of the tight supply of open-top freight cars and railroad motive power, according to ODT. Such stringencies, it is said, are likely to be more frequent and to last longer this year than in 1942.

★ ★ ★

PRICES have been announced by OPA on two new grades of copper alloy scrap. The new grades are tinny bronze (phosphor bronze) solids with a maximum base price of 10½ cents a pound, and zincy bronze solids with a maximum base of 8 cents a pound. Both prices are subject to established deductions for nonmetallic impurities.

★ ★ ★

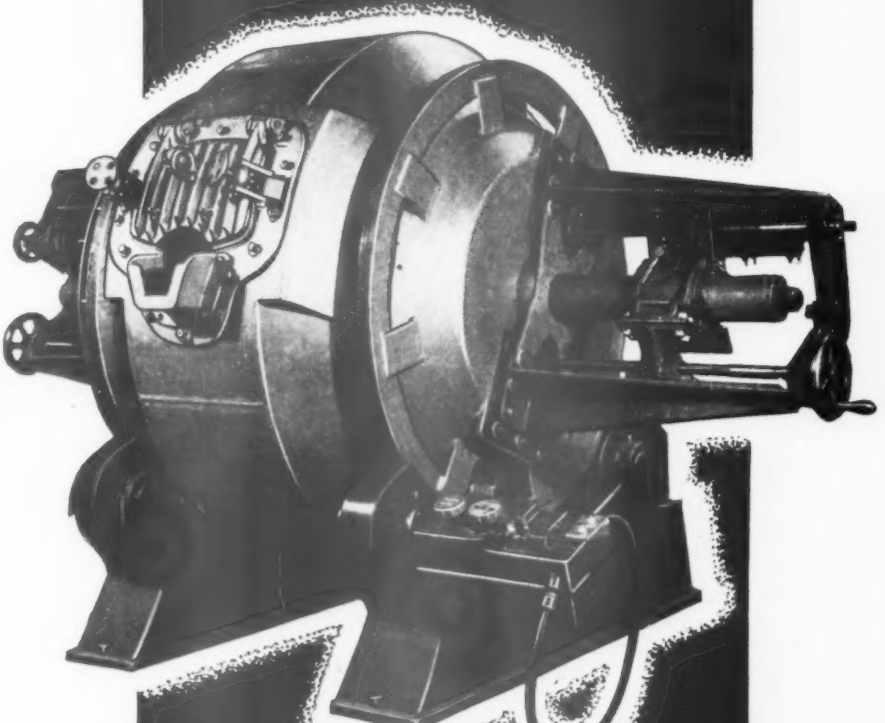
Lead supplies have improved to the point where restrictions have been removed from its use for essential purposes. Only non-essential uses remain under control. Revision of Order M-38 is intended to make lead more readily available as a substitute for more critical materials going into essential production.

★ ★ ★

SELLERS of all magnesium or magnesium alloy ingot manufactured in nonstandard shapes and sizes may add a premium of 1 cent a pound to appli-

BETTER PRODUCTION
BETTER CASTINGS...

Detroit furnaces are used for triplexing, duplexing, or cold melting any desired number of hours per day on large heats or small. Versatile, flexible and fast melting, these furnaces insure highest quality metallurgical results under accurate control. They save labor, metal, fuel and time. Their inherent economy is further enhanced by their frequent use of salvage materials such as borings, turnings and other scrap. Write today for further facts and prices.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

cable maximum base prices, provided the purchaser has specifically requested the particular shape or size, according to an OPA ruling.

★ ★ ★

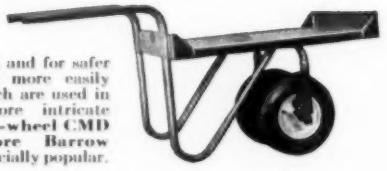
A number of buildings will be warm this summer because their air-conditioning units have "gone to war." More than 50 firms—mostly stores, office buildings and hotels—have turned over their equipment for use in plants producing high octane gasoline, synthetic rubber and precision parts. One large airplane plant requiring 9000 tons of refrigerating capacity is now going into operation with 68 per cent borrowed equipment.

MAXIMUM prices on die castings have been established by OPA, effective May 1, at lowest levels prevailing between April 1, 1942 and April 30, 1943. Die casting prices formerly were under jurisdiction of the General Maximum Price Regulation. The new regulation is MPR 377.

★ ★ ★

Order P-31-a has been revoked. It was originally issued to permit extension of ratings applied under Order P-31 to deliveries of materials for production of foundry equipment prior to expiration of P-31 on May 30, 1942. Such material now is obtained under CMP.

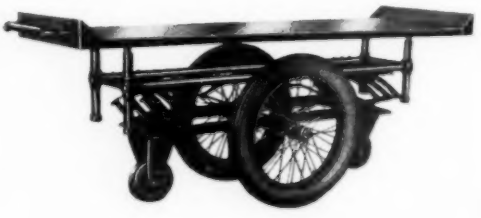
In the core room or foundry, you'll find **CMD Pneumatic Core Barrows** mighty handy to get in and out of tight, crowded places. (Illustrated at left is Type C-1)



For heavier loads and for safer handling of the more easily chafed cores which are used in making the more intricate castings, the **two-wheel CMD Pneumatic Core Barrow** (Type C-2) is especially popular.

With Type A-27 **CMD Core Trucks**, two men can do the work of 3 or 4 using ordinary conveyances. Bench-high steel trays speed loading. Three sizes for load capacities of 800 lbs., 1000 lbs., and 1200 lbs.

PROTECT CORES from DESTRUCTIVE VIBRATION with



CMD PNEUMATIC CORE TRUCKS

When cores are handled by ordinary conveyances, core chafing and breakage not only cost the foundry money, but also slow up war production. For complete protection, convey your cores on CMD Pneumatic Core Trucks and Core Barrows. An exclusive coil spring in the upright supports assures maximum resilience even under light loads. Pneumatic tires cushion the load from destructive vibration. On the trucks, elliptical springs provide additional resilience. Write for the new 4-page circular on CMD Core Trucks and other foundry supplies!

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Manufacturers of a complete line of core-conveying equipment and foundry specialties

Dept. 7F, 1928 W. 46th Street CHICAGO, ILL.

RECLAIMED lubricating oil has been exempted from fuel oil rationing regulations. The move is intended to encourage the burning of such oil in industrial heating and processing, but it may be used only by those whose plants normally burn Bunker "C" and No. 5 heavy oils.

★ ★ ★

Chromium now may be delivered by processors and dealers in quantities of 3000 pounds or less to a single customer in any one month without WPB authorization, provided it is to be used for metallurgical purposes. As before, larger shipments require authorization. All consumers still are required to file Form WPB-532 with the Bureau of Mines.

★ ★ ★

MONTHLY percentage restrictions on placement of controlled material orders have been eliminated. Orders still may not be placed for delivery in greater amounts or on earlier dates than needed for authorized production, but the former prohibition against ordering more than one-third the quarterly allotment for delivery the first months and two-thirds during the first two months is out.

★ ★ ★

Another change in CMP Regulation 1 is in the method of identifying months and quarters. This kills the slightly complicated numerical system previously in effect. Starting July 1, allotments will show the quarter for which purchase authority is valid, for example, as follows: "3rd Quarter 1943" instead of "19." Controlled material orders should indicate the required delivery month, such as "July, 1943" plus the quarterly identification.

★ ★ ★

INDUSTRY shortly will be required to become familiar with an entirely new set of numbers identifying various WPB forms. A simplified system of identifying these forms is being put into effect as present stocks are exhausted and reprinting becomes necessary. All forms in the WPB, PD, UF and RD series will eventually bear only the initials WPB, followed by new serial numbers. Authorizations, allocation and other form stationery used by industry divisions and field offices will carry the prefix GA (General Administrative), provided it does not seek information from industry. Each form as it is renumbered will carry both old and new designations until users become familiar with the change.

★ ★ ★

Full application July 1 of the Controlled Materials Plan for one thing means that deliveries of steel products hereafter are not regulated by the preference rating system (A-10 or higher rating) but must come under CMP regulations, or as permitted by Priorities Regulation No. 13 or by the orders covering distributors. Second quality material is under similar control. However, iron products and steel forgings may still be delivered on a rat-

ing of A-10 or higher since they are not classed as controlled materials.

★ ★ ★

A new procedure for obtaining permission to hire aliens has been made available to holders of government airplane and secret, confidential or restricted contracts. Forms to be filled out and submitted to the head of the government department concerned may be obtained from local offices of the United States Employment Service, and in normal cases a decision may be expected within two weeks. On other types of contracts, of course, hiring of aliens is permitted and encouraged.

★ ★ ★

As part of a program to simplify tool design, the number of sizes in which rotary files are produced has been cut by WPB from 380 to 70, through the addition of Schedule 4 to Limitation Order L-216. Also shanks for rotary files ½-inch or more in diameter will be made of carbon steel only.

★ ★ ★

IRON and steel scrap supplies have missed the headlines lately, although actually there is a shortage of a selective nature. There are too many turnings and borings and not enough heavy scrap. There is also a geographic unbalance. Overall inventories have declined steadily since the first of the year, and unless the situation improves we shall have renewed attention directed toward the scrap shortage problem before fall.

★ ★ ★

Industrial users of calcium metal may obtain small quantities for consumer use under an amendment of Order M-303. Receipt and use of 3 pounds monthly in the form of carrots, or 2 pounds in any other form, now are permitted without specific authority of WPB.

★ ★ ★

CONSUMPTION of castings by the farm machinery industry will be increased substantially as a result of an enlarged production program authorized by WPB to get under way July 1. Third quarter allocation of carbon steel for this purpose totals 300,000 tons, with other materials in proportion. A new order replacing L-170 provides for production of new machinery at approximately 80 per cent of the 1940 level.

★ ★ ★

A load directive procedure permitting reservation of a percentage of any steel foundry's monthly capacity for emergency MRO orders under CMP has been established. Foundries desiring such load directives should write the Steel Division referring to CMPL-286, stating the maximum portion of expected production which should be reserved for the emergency MRO orders. This action was taken because many foundries met difficulty in scheduling such orders to meet industrial and service requirements.

W. G. G.

Stresses Safety in Worker Training

War plant supervisors are told how to guide workers and to check on working conditions, so as to prevent on-the-job accidents, in a pamphlet called "Safety Speeds Production" issued by the United States Department of Labor and available upon request.

It discusses the qualities of a good supervisor, how to instruct, what to teach, the woman worker, dealing with individuals, and securing co-operation of workers—all from the point of view of making safety an integral part of production. It points out important considerations in plant housekeeping, handling materials, tools for the job, machine guarding, and safety equipment.

A new catalog listing 140 books, patents, and journal contributions has been published by Battelle Memorial Institute, Columbus, O. The catalog covers Battelle publications and patents for the years 1941-42 and supplements a previous listing of more than 500 publications and patents of prior date, which are published in 1941. Copies of the new catalog and the prior listing which it supplements are available upon request to Battelle Memorial Institute.

For MORE SPEED
in Snagging Steel Castings
.....with particular reference to
Swing Frame and
Stand Grinders
DAYTON GRINDING WHE
DAYTON GRINDING WHEELS
A Tough WHEEL
The snagging of steel castings calls for a tough wheel—a wheel that can do the job fast—at a low cost.
Many of America's most progressive steel and gray iron foundries find Dayton Correctly Bonded Grinding Wheels give their cleaning departments a new standard of efficiency.
DAYTON GRINDING WHEELS
SIMONDS WORDEN WHITE COMPANY
710 Negley Place • Dayton, Ohio

CASTS ARMOR FOR TANKS

(*Continued from page* 82)

movement of sand into the hoppers, operate the weigh lorries, and add the binder to the mixture. Operation of the mullers and the addition of the water is controlled from a central panel which is operated by a woman.

During the mixing operation, sand samples are removed and given the test of the artisan by squeezing in the hand. Here again, women have been trained quickly to apply the skill to this job which previously was considered possible only through long experience in the handling of sand. Use of women on each job has been the result of considerable study on the part of management, and the company reports remarkable success in this phase of the new undertaking. In general, it would seem that women take a greater pride in their work than usually is displayed by men. As a rule, women are neater and go to greater effort in keeping clean that portion of the plant in which they work. It is anticipated that the use of women in the plant will increase as the war is prolonged and the shortage of manpower grows.

After the molding sand has been properly prepared in the mullers, shown in Fig. 6, it is discharged into an elevator hopper, and elevated to an overhead conveyor which carries it across the center bay to the molding sand conveyor located along the roof supports of the north bay or No. 1 foundry. The prepared sand is discharged from the conveyor by plows into two large hoppers serving the molding floors in that foundry, and is carried from the hoppers to the two sandslingers located in that foundry in 20-ton buckets handled by overhead cranes.

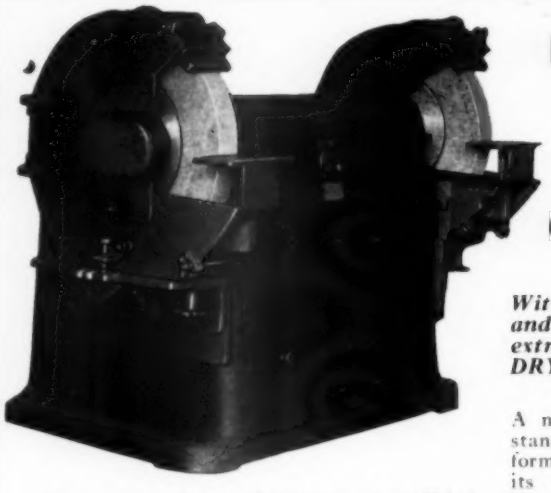
Core sand, after being mixed, also is discharged into an elevator hopper, elevated to a cross conveyor which carries it to the overhead core sand conveyor. This conveyor extends approximately 600 feet along the roof supports on the south side of the center bay, and carries the sand to a number of hoppers located over the coremaking machines and core benches in that part of the foundry. Plows, operated by hand, are employed to direct the sand from the conveyor belt into the hoppers, as may be desired. Again it should be pointed out that a complete duplicate of the equipment for preparing and handling molding and core sand is located in the opposite or east end of this great plant.

Support Core on Arbor

Large cores, such as those for producing turret castings, are made on a stationary type slinger located at the west end of the center bay, as shown in Fig. 3. The turret core is well supported by an extensive framework of arbors, and these are bolted to a supporting arbor or bar which is above the core itself. This supporting bar is longer than the diameter of the turret core and extends beyond the core, as may be seen in Fig. 1. The core is drawn from the corebox by an overhead crane and then is hung between two upright frames by the supporting bar or arbor. It is interesting to note that the tops of the uprights have a spring arrangement designed to ease the jar on the green core when it is lowered onto the supports by the crane. In this hanging position the core is finished prior to drying.

After the turret core has been finished, it is lifted by overhead crane and lowered into an interesting type of gas fired core drying oven. The oven is constructed with four openings in the roof which have hinged doors so counterweighed as to be held in the closed position at all times, except when opened to receive or remove cores. After the cores have been baked the proper length of time, they are removed by overhead crane and taken to the molding floor in No. 1 foundry and are set in the turret casting molds.

Due to the nature of the castings manufactured at this plant, considerable core producing capacity is necessary. In addition to the turret cores, larger cores also are produced on four conveyor lines



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Multi-Speed
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GRINDERS

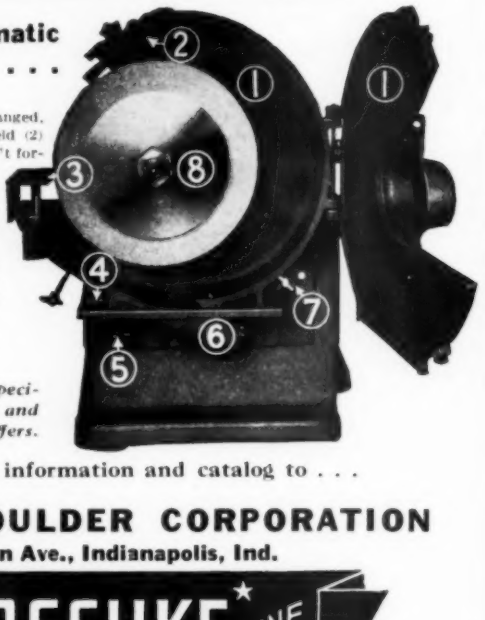
With 10 to 25 HP motors and 24" x 4" wheels for extra heavy duty FOUNDRY grinding!

A massive Marschke floor-stand grinder that performs as well as it looks . . . its efficiency accounts for its great popularity. Triple strands of V-belt and a pair of three-step pulleys supply ample power at three wheel speeds to maintain approximately constant s.f.p.m. for all stages of wheel wear. Its rigidity is partially indicated by the spindle dimensions of $2\frac{3}{4}$" between flanges, $3\frac{3}{4}$" between bearings and 62" length.

"BUILT for the job . . . not to a price"

The MARSCHKE Automatic Guard for 24" Wheels . . .

(1) Boiler plate, welded construction; flanged, spark-safe cover. Patented spark shield (2) hugs wheel automatically. Operator can't forget, for in adjusting work rest (3) to follow wheel wear, he moves guard and link, automatically adjusting spark lip to safest position. Guard adjusts horizontally, by hand and with little effort. Guiding tongue slides in machined and fitted ways (4) and is locked by means of hand wheel (5). Table mounting assures constant squareness with wheel. (6) Exhaust. (7) A.C. plunger setting. (8) Note big wheel flange.



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Write for complete information and catalog to . . .

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located adjacent to the slinger flow. These cores are rammed with pneumatic hand rammers. After ramming, the corecoxes are rolled over on a special rollover type machine built into the conveyor, and the core is stripped from the corebox. Cores on plates then are transported by industrial trucks to one of a series of core ovens located in the No. 2 foundry. The ovens, divided into groups of eight units, are of the rack type, gas fired, and are operated at temperatures of 450 degrees Fahr., or above.

Cores of medium size are produced on eight rollover-jolt machines which are located under hoppers served by the core sand conveyor. In producing these cores, the sand is dropped into the box from the overhead chute, the corebox is jolted and the ramming is finished with pneumatic hand rammers. The corebox then is rolled over, the box drawn, and the plate holding the core is handled by jib cranes from the machine to the rack for transportation to the drying ovens. A section devoted to the production of smaller cores on benches is located beyond the jolt machine section. After the cores are dried in the ovens, they are removed by truck and placed in storage in the core department for later transportation by truck to the various molding floors of the foundry.

Employ Large Flasks

Molds are made in the north bay or No. 1 foundry and in the center of the middle bay or No. 2 foundry. Six sandslingers are employed for the purpose, the three in the west half of the plant being duplicated in the east half. The No. 1 slinger, shown in Fig. 2, is operated on a track running parallel to the length of the main building, and located near the west end of the north bay. This machine and the accessory equipment in the section is used for the production of turret castings and similar jobs that can be produced in flasks of the same size. The turret mold is made in a flask with inside dimensions 7 feet 8 inches by 8 feet 9 inches. Empty flasks are handled by gantry cranes serving the entire length of track used by the slinger. After the molds are rammed, with all ramming operations controlled by a woman seated at the control station on the slinger head, the flask is stripped from the pattern by overhead crane, a vibrator being employed to assist in this operation. The mold, in the same position in which it was made, is carried to the opposite side of the molding bay and is placed on four uprights approximately 3 feet high, as shown in Fig. 2, so that molders can get under the mold to complete the necessary patching and finishing.

After finishing, the molds are carried a short distance by overhead crane to special drying ovens near the west end of this molding bay. This equipment has a row of four rectangular brick foundations about 2 feet high and of the same width and length as the flask in which the turret mold is made. The flask containing the mold, with the mold cavity at the bottom, is placed on the brick foundation units. Heated air from the combustion chamber of the oven is driven by a fan to the individual mold supporting units, and is deflected to all parts of the mold cavity by ducts and baffles. This equipment performs the skin drying operation in an efficient manner, and the time required for the operation has been reduced materially.

The mold then is picked up from the skin drying oven by overhead crane, rolled over, and placed on a bottom board along the pouring floor. Cores, including the large turret core previously described, are set in the mold and the entire assembly is clamped as may be noted in Fig. 1. The mold is poured through a pouring cup and a gate extending through the center of the large turret core to the bottom of the mold. The turret casting is virtually a large bowl produced in the upright position. That part of the mold producing the outer rim of the bowl is extended and open, so that the casting is provided with a riser extending around the entire periphery of the turret casting.

After the casting has cooled sufficiently, it is stripped from the mold by an overhead crane and is transported to the rough cleaning floor in the south bay by tractor trailer. Used sand is picked up by a bucket suspended from the overhead crane and is taken to the shakeout

HAUSFELD
METAL MELTING
FURNACES

...MAKE COKE PIT FURNACES OBSOLETE

The battery of Hausfeld stationary type Crucible furnaces shown above is one of many recently made in brass foundries formerly operating coke pit furnaces.

Burning gas or oil, each furnace is a self-contained, independent unit, individually controlled by its own motor and blower. Each furnace may be used for melting a different mix, brass, bronze or other copper alloy. All furnaces may be operated at once, or any one may be shut off at will, with immediate saving of fuel.

The superior flexibility of Hausfeld Furnaces is due both to perfect combustion and to mechanical construction. Crucibles and linings last longer; metal losses are minimized; melting time is reduced; output is increased and costs are cut.

Types and sizes for all non-ferrous metals, tested before shipment.

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

hood on the opposite side of that bay. Here it is screened to remove rods, gaggers and cores, and then is carried on belt conveyor to the used sand storage bins. However, the fine sand around the casting is removed first and is taken in trucks to a small shakeout in the south bay. After screening, this sand is passed through the hydroblast unit for washing, and then is transported to the washed sand storage. In the neighborhood of 50 per cent of the used sand is washed before being used again.

No. 2 slinger operates in the same bay to the east of the molding station previously described, and is devoted to the production of other classes of armor castings which are somewhat smaller in size. This machine also is of the motive type and is operated over a track extending several hundred feet along the molding floor. The machine is served by gantry cranes which handle the flasks, strip the pattern, set cores and close the mold. Molds produced at this station are skin dried with a flame. After the molds are closed they are carried across the bay by overhead crane and placed on the pouring floor.

When cooled sufficiently, the entire mold is carried to the shakeout across the bay. This shakeout is similar to the one at the turret casting floor, and consists of a heavy vibrating screen about 12-feet square. The screen is hooded on three sides, and has a relatively small slot opening along a portion of the top so that the overhead crane may swing the mold and castings onto the vibrating screen. The entire system is provided with equipment to remove and collect the dust. After the used sand has been screened, it is elevated to a belt conveyor which runs parallel, but in the opposite direction from the molding sand conveyor. The used sand is carried to the shakeout serving the turret floor, which previously was described, and is deposited onto the belt conveyor carrying the used sand across the middle bay to the used sand storage bins in the south bay.

A variety of smaller castings are made at the No. 3 molding station located at approximately the center of the building in the middle bay. The slinger producing molds at this station operates on a track extending the length of the molding station on the south side of the bay. Four sets of roller conveyors extend from the molding machine track across the middle bay and into the north bay where the molds are poured. Two sets, each having two conveyors, are used in the production of the cope and drag for a single mold. A standard size of flask is used for more than one pattern.

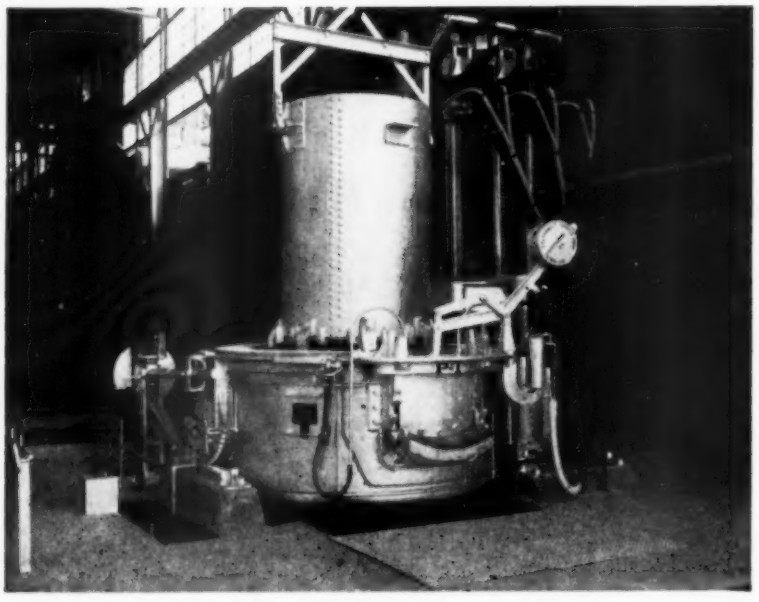
Made in Orderly Sequence

In operation, the drag flask is carried from the shakeout in the north bay to the slinger station on the first conveyor, is rammed up, and then the drag is transferred to the second conveyor by a jib crane. Here it is finished, the coil chills are put in place, the nails inserted, the mold sprayed and then flame dried. The cope flask is moved from the shakeout floor on the fourth conveyor, is rammed, and then transferred to the third conveyor where it is finished and dried. After the cores have been set, the mold is closed and then is moved to the pouring floor. The sequence of operations is the same on the remaining two sets of conveyors.

The plan for having duplicates of the entire foundry would call for a similar molding station served by conveyors immediately to the east of the station just described. However, the conveyors have not been installed and No. 4 slinger is being used to produce molds for the large front housing of the tank. The drag flask is secured in a cradle, rammed up, and then the entire cradle and mold is rolled over with the overhead crane. The drag, which is simply a core, is placed under a hood for skin drying. The cope is dried on an oven similar to that used for the turret molds. After drying, the remaining cores are placed in the drag, the mold is closed and taken to the north bay for pouring. No. 5 and No. 6 slingers are located in the east half of the north bay, in positions similar to those of No. 1 and No. 2.

Metals used in the production of cast armor plate, including pig iron, scrap, ferroalloys, etc., are brought from the storage yard to the east end of the plant in buggies. These are moved on a ramp

More steel tonnage p. m. h.



LECTROMELT top charge furnaces increase steel output per man hour by decreasing the time interval between heats. The roof of the furnace is hydraulically raised and rotated to one side and then charged by a drop bottom bucket. Illustrated is a 3-ton Lectromelt being charged in this manner. Lectromelt top charge furnaces are available in sizes from 250 pound to 100 ton. Our engineering staff will welcome the opportunity of discussing furnace requirements and characteristics with you.

Moore Rapid Lectromelt Furnaces

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to the charging floor of the furnace department. A view of the charging equipment in operation is shown in Fig. 7. The plant is equipped with open-hearth furnaces of 30-tons capacity each, and provision has been made for the installation of more should occasion require.

After melting and refining, the metal is tapped into 30-ton capacity, bottom pour ladles and is transported to the pouring floors in the north bay by overhead cranes. A heat being tapped into the ladle is shown in Fig. 8, and the pouring of a mold is illustrated in Fig. 5.

At the roughing floor, gates, risers and inside cores are removed. The castings are transported by crane and roller conveyors to the heat treating and final cleaning departments. The sand removed from the casting is carried by trucks to the hydroblast unit for washing. A view of the plant, which includes the washing equipment, is shown in Fig. 3.

A special rig has been developed to cut the riser from the turret casting, as shown in Fig. 9. This casting is mounted on a special jig in the same position it occupies when installed on a tank. This is the inverted position from which it was poured, and therefore the riser, which extends entirely around the circumference of the casting, is at the bottom. A flat, circular platform entirely surrounds the lower part of the casting, and this supports a gas cutting torch at the proper height to cut off the riser exactly at the desired place. The cutting operation is started and then the torch is moved around the circular platform at the speed required to complete this cutting operation. A groove around the surface of the platform holds the torch at the desired distance from the casting which is being cut.

Castings Are Normalized

From the roughing floor the castings are taken to one of four normalizing ovens. After normalizing, the castings are allowed to cool in air, and then are taken to the blast houses for shot blasting to remove excess scale. Smaller castings treated in duplicate heat treating and finishing department, are shot blasted in table type machines. Castings then are transported by crane to the rough chippers, and after any projections or imperfections are removed, are inspected and the dimensions are checked.

The castings then are passed through the preheating ovens and following this are welded. Excess metal from risers and gates also are burned and ground off.

A number of hardening and draw furnaces are provided for the heat treating operation. Furnaces for treating the larger castings are of the car type, and those for the smaller castings of the pusher type. The castings first are passed through the hardening furnace and then are quenched in water. They then are transported on cars or conveyors to the final furnaces where they are heat treated to draw and then are quenched in water.

From the furnaces, the castings are taken to another shot blast room where they are blasted to provide a smooth finish. This is followed by the final rail where they are given a second chip. The castings then are mounted on a surface plate and given a very complete check for dimensions. Here again, it has been found that a woman can handle this job in a most satisfactory manner. After this checking, the castings are given final tests and inspections, are painted, weighed and loaded for shipment.

Versatility is in all probability the most striking feature of this enormous steel foundry. While the plant was built to produce huge quantities of cast steel armor plate quickly and economically, the entire facilities of this modern foundry may be converted almost immediately to the production of practically any types of steel castings which may be required by the American government for the prosecution of this war. Much credit should be given to the engineers and designers who planned and developed this most valuable contribution to the job of winning the war.

The story of the future is told in the following recent advertisement of the company:

"American Steel Foundries is an 'old hand' at making steel castings for exacting demands.

"The war has brought us new prob-

"Built-In" Motor Drive with Cooling Unit Mounted on Base

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is always out in the lead in the compressor field. A name that is written on every important development and contribution to compressor history. The more recent developments that keep SCHRAMM out in front include: lightweight at all points of moving contact . . . uniform expansion of all metals subject to heat . . . perfect timing . . ruggedness without excessive weight . . . perfect balance.

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★ Greater Discharge Valve Area
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WEST CHESTER·PA.

lems . . . the production of steel castings for armament, including tanks, gun castings and ship castings.

"We have solved these new problems . . . and have developed castings to meet the requirements of our Army and Navy.

"And when the war is over this added experience will be available in the solution of new problems in the railway and industrial fields."

Grobet File Co. of America, importer of Swiss files and manufacturers of rotary files, has more than doubled the factory area of its New York plant in order to provide greater production.

COMPETITION LICKS ABSENTEEISM

(*Continued from page* 89)

teeism declined. This was to be expected, for usually those remaining on the job can and do carry at least part of the burden of those who are absent; and then, of course, overtime can be resorted to, if necessary, in some cases.

Prior to inauguration of the new plan, the management employed the usual methods of combating absenteeism, such as interviews, lectures, posters, appeals, the posting of offenders' names on the bulletin board, and so forth, but these measures only tended to make the offenders resentful without improving the situation.

Consequently, Superintendent C. E. Gerald decided upon a different and more positive approach to the problem. Instead of posting the names of those with poor records, he began posting the names of those with perfect attendance records. At first he credited men who had legitimate excuses for absence as having perfect records, but this later was revised so that only perfect attendance was given credit. Names were posted at the end of each week, although originally the plan was to post them at the end of each month. Incidentally, photographs were to have been taken at the end of each 3-month period, but this schedule likewise was stepped up to a monthly basis.

Each week a running account of the results, together with comment, is posted at the plant. Here teamwork and the importance of the product to the war effort, are stressed.

Teams Were Organized

In addition, and the most important phase of the program, the shop was organized into teams. Each team comprised either seven or eight men led by a captain and a co-captain, the first being a man with a good attendance record and the second, interestingly, one with a poor record. Under this plan of team competition, a backslider would have an added incentive for staying on the job, and if the incentive did not prove adequate, he would be under pressure from teammates to stay on the job, anyway; and a man entering into the spirit of the competition, but actually too sick to work, or absent for some other legitimate cause, would have incentive to get back as quickly as possible for the sake of his team's standing, for if his team came out on top he would still be a winner.

Team standings are posted each week and the prize for the team with the best attendance at the end of the month is a beer and oyster supper. Originally it was planned that the team with the poorest record was to wait on the table, and moreover, was not to share in the beer and oysters. An improvement in this plan was suggested by the men and promptly adopted. It was decided to select four men with the best individual records from the losing teams, to perform waiter service and, the very essence of importance, to participate in the supper after the victors had been served. Now everyone present is in on the party and to be in on the party is something that all can strive for, despite the records of their individual teams.

A problem developed is how to limit the number among the losers who would willingly serve to get in on the affair. To take from all losing teams the men

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who had perfect attendance records might clutter up the place with waiters, and make for undue confusion. So one representative from each of the losing teams is drawn and then these winners draw until four remain. The intent is to have each of the four winners come from different teams, if possible.

The names of the teams are worthy of space: Red Hot Melters, Scrappy Chargers, East Side Molders, Demon Cleaners, Night Hawks, West Side Molders, Outside Gangsters. So far, it appears, the Red Hot Melters and the Scrappy Chargers have turned in the best performances. But the others are still in there pitching, so the story a few months from now may be different.

From the first the management has encouraged employes to submit ideas, and has received full support from the union—all to the end that the Stay-on-the-Job plan will continue to give results. Men at the plant are very enthusiastic about the plan, and are really working at it. Needless to say, results are being watched with keen interest by the other plants in the Brake Shoe company.

Steel Casting Cores Spun Vertically

(*Concluded from page* 95)

with a geared bull ladle. The safety feature of the geared bull ladle is that it can be left in any position without danger of tilting. All pouring is done from an electric gantry crane.

The cores are removed from the jacket by picking up the entire jacket by two trunnions as shown in Fig. 11 and turning it over. All the shaking out is done into a pit as may be observed in Fig. 12. The spinning floor and pit are connected with an exhaust system to remove all fumes and gases from pouring and shaking out.

Fig. 9 shows a cope view of castings with gating and feeding arrangement. This also illustrates the flange on the hub which shows a permanent die and chill previously discussed in Fig. 4C. A drag view of the same castings is depicted in Fig. 10. This shows an arrangement of the gates. The heavy casting has two connecting gates to the sprue while the lighter bushing shows only one.

Vertical arrangement of the drives located in a pit below the pouring floor may be seen in Fig. 13. The average spinning speeds vary according to the type of castings from 150 to 250 revolutions. Fig. 14 shows the finished castings ready for shipment.

The cost of core molding, while considerably higher than green sand machine molding, is offset by the finished casting, and a higher yield. The average yield for centrifugal casting is 71.3 per cent.

Procurement Division, U. S. Treasury Department, recently has cancelled emergency alternate Federal specification E-QQ-A 596 for Aluminum-base Alloy Permanent Mold Castings since it has outlived its usefulness.

Determines When to Scrap Equipment

To determine whether a piece of material or equipment should be used in its present form or put into war production in the form of scrap, the Special Projects Salvage Branch of the Salvage Division, WPB, is publishing, bi-monthly, "Available Used Material and Equipment Bulletin".

This publication, providing a ready guide for scrap determination, is distributed to approximately 3000 government procurement offices and contractors. If any material or equipment listed in this bulletin can be put to use by these agencies, they contact the owner for purchase, and the listing is terminated. If the material or equipment has not been sold within a stipulated period (usually 60 days) after listing, the regional office of WPB takes every possible step to move the material as scrap.

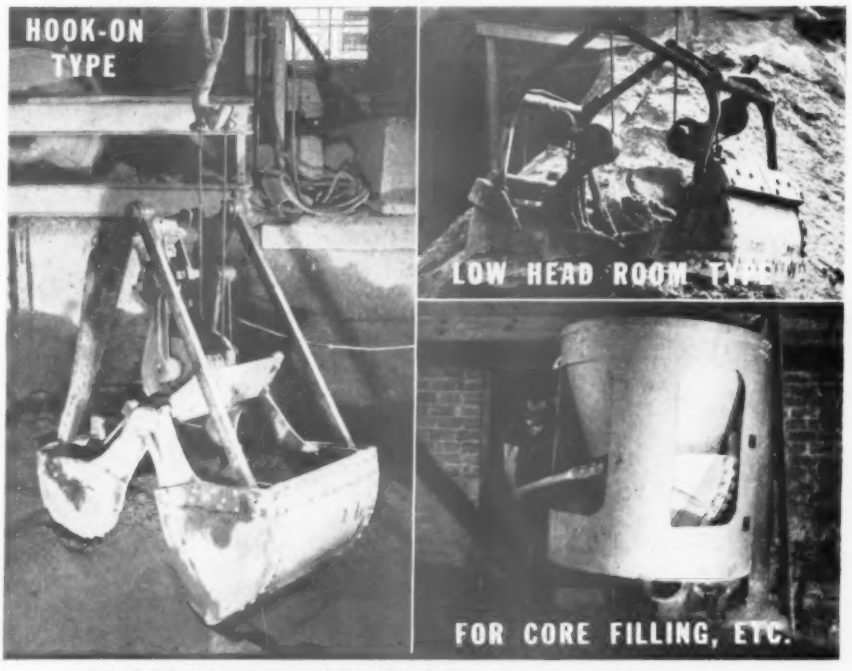
The American Society for Testing Materials, 260 South Broad street, Philadelphia, recently has approved a new tentative standard for the determination of selenium in steel. The standard bears the designation E30-43T, and makes use of the sulphurous acid-iodometric procedure.

Blaw-Knox "hook-on" BUCKETS *take the least of your crane time...*

Blaw-Knox Foundry Type Single Line Buckets are made *convenient* for you—they can be hooked on or off the crane block as required. They operate easily and they last long.

Blaw-Knox has a wide variety of foundry clamshell buckets to choose from—considering the available operating clearance, crane load capacities, working space limitations, character and state of material to be handled, safety features.

See Blaw-Knox Buckets in Catalog No. 1696—yours for the asking.



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TREATMENT OF ALLOY CAST IRON

(*Continued from page 92*)

melting or finishing due to the close composition control that is necessary.

Tensile properties vary from 55,000 to 100,000 pounds per square inch, with an elastic limit of approximately 75 per cent of the ultimate strength. Elongation varies from an upper range of 8 to 12 per cent for the lower strength irons to a low range of 1 to 4 per cent for the high strength types.

The heat treatment usually consists of breaking down all or most of the chill at 1700 to 1800 degrees Fahr. followed by controlled cooling rates which vary from air cool to combinations of heating and furnace cooling to obtain the desired properties. McElwee[2] describes an iron containing a base composition of 2.50 per cent total carbon and 1.30 to 1.70 per cent silicon treated as follows: 4 hours at 1725 degrees Fahr.; cool to 1325 degrees Fahr. 4 hours; furnace cool to 1100 degrees Fahr.; air cool.

Annealing may be used to soften castings already gray throughout to facilitate rapid machining. The usual result is a general softening of the iron accompanied by a deterioration of the mechanical properties. The rapid softening and weakening of plain cast iron when heated above 1200 degrees Fahr. is illustrated in the data of Fig. 2. Careful control is essential to limit this reduction in physical properties.

There are two common methods of annealing that accomplish the desired purpose. Temperatures vary, depending on the composition of the cast iron being treated. The usual procedure involves heating the casting above the upper critical range, holding at temperature for definite time intervals, and then cooling at a predetermined rate to room temperature. Usually, 1500 to 1600 degrees Fahr. is high enough for plain irons. The time at temperature usually need not exceed one hour per inch of section. Thus, a 10-inch thick section may be heated through and soaked enough after 10 hours. Longer periods of heating at temperatures above the critical may produce appreciable changes, as indicated in Fig. 2.

Once the casting has been uniformly heated at the annealing temperature, it is the rate of cooling, as illustrated in Fig. 3, through and immediately below this range that will establish the final combined carbon content, the amount of softening, and the degree to which the physical properties deteriorate.

Iron Is Softened

The other procedure that may be used to soften prior to machining is obtained by heating to a temperature of 1200 to 1400 degrees Fahr., just under the critical transformation (where maximum rate of graphitization takes place) and air cooling directly or furnace cooling, as required. This procedure is more rapid and does not tie up furnace equipment to the same extent. For plain irons, the temperature most suitable for this treatment is 1350 to 1400 degrees Fahr.

In some cases annealing is applied to harden and strengthen a specially alloyed cast iron. Recent work by Flinn and Reese[3] dealing with the influence of alloys in retarding the rates of transformation and lowering the temperature at which certain transformations take place, shows that an anneal in the relatively low temperature range of 600 to 700 degrees Fahr. produces a marked improvement in strength without an appreciable change in hardness.

Test bars of standard size show the "as cast" 75,000 pounds per square inch tensile strengths of low carbon, nickel-molybdenum irons approached 100,000 pounds per square inch tensile strength after a low temperature anneal at 600 degrees Fahr. (See Table II).

Gray irons, suitable for heat treatment, should possess a finely-distributed-graphite-flake structure and a full complement of carbon in solution to deliver the best response to heat treatment. Low carbon or low silicon base compositions fortified with alloy respond best, as il-

"BRANFORD"
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★ Made in sizes that will shakeout flasks 2′ square up to 20′ x 24′ x 4′ deep.

★ Jaw construction will take wide variation of flask flanges without change.

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WORK	NO. MEN		TIME PER MAN
Cope 9′ x 15′ 4″ x 14″	Shakeout by Hand	9	25 min.
	With Branford Vib.	2	20 min.
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	With Branford Vib.	2	18 min.

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lustrated quite clearly in Fig. 4.

Any cast iron can be strengthened or hardened by suitable heat treatment. The difference between plain and alloyed cast iron, in this respect, is in the degree of response. A properly alloyed cast iron will respond sharply, positively, while the plain iron's response may be sluggish and uncertain. It might be well to emphasize the importance of density or close grain as one factor in the susceptibility to heat treatment. If, as in the case shown in Table III, an open grained condition exists, difficulty in hardening may occur.

Material A revealed, upon inspection, a high degree of open-graininess manifest by having its graphite structure appear to represent a 3.70 per cent total carbon type of iron rather than a 3.35 per cent. This was attributed to a gassy condition which registered as so much additional graphite structure and so weakened the casting that abnormally low hardness values were obtained.

Since the critical range for high carbon steels is approximately 1300 to 1350 degrees Fahr., and it is raised by the presence of silicon, it is customary to heat to 1450 to 1550 degrees Fahr.; hold long enough to heat the work through, then quench, usually in oil. In some cases, preheating the castings slowly to 900 to 1100 degrees Fahr., then transferring into a hotter furnace, or otherwise stepping up the temperature, reduces the risk of unequal heating and subsequent cracking. Oil quenching as compared to water quenching reduces the violence of the quench and seems to develop maximum hardening and less distortion. After quenching, castings should be tempered at some temperature above 300 degrees Fahr. to eliminate some of the residual stresses and thus reduce the extreme brittleness possessed by quenched castings.

(To be concluded next month)

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2. McElwee, R. G., "Heat Treatment of Cast Iron", *Transactions*, American Foundrymen's Association, 1935, Vol. 43, pp. 27-38.

3. Flinn, R. A., and Reese, D. J., "The Development and Control of Engineering Gray Cast Irons", *Transactions*, American Foundrymen's Association, Vol. 49, 1941, pp. 559-607.

Hillside Fluor Spar Acquired by Inland

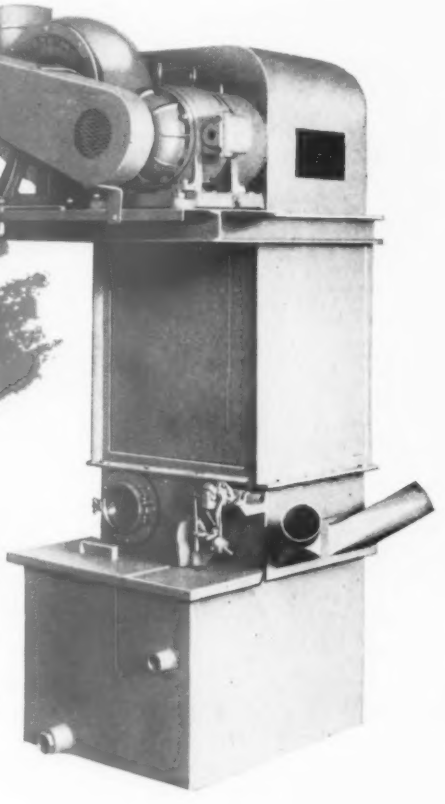
Inland Steel Co., Chicago, has acquired all the capital stock of Hillside Fluor Spar Mines, Rosiclare, Ill. The latter company will be operated as a separate unit and will continue to supply fluorspar to other consumers as well as to Inland, which in the past has been Hillside's largest customer. The company was founded in 1919 by the late G. H. Jones who was a co-founder and a major stockholder of Inland. H. W. Hurst will continue as general superintendent at the operating office at Rosiclare.

Manual Treats Wage Stabilization Law

A manual of questions and answers for employers, executives and employes on wages and salary stabilization, prepared by Arthur W. Nevins, has been published by the National Foremen's Institute, Deep River, Conn. The booklet contains 39 pages and covers such questions as: May an employer continue to pay bonuses or other extra compensation to his employes; On what terms may bonuses and other extra compensation be paid; In what circumstances may an employer increase the wages or salaries of his employes; What inequalities and gross inequities justify wage increases; When will the Labor Board approve increases to remove substandards of living; When may the wage or salary of a trainee, learner or apprentice be increased without specific approval of the War Labor Board or commissioner of Internal Revenue?

American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill., has issued a 45-page bulletin entitled, "Manganese Steel for General Industry" which describes in text and illustration the various applications of the manganese steel castings manufactured by that organization.

Another Hydro-Whirl of the Orifice type



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METALLURGY IN THE CASTINGS INDUSTRY

(*Continued from page 85*)

reliable data on the behavior of gray iron, particularly the improved classes, in actual engineering service. This neglect has been an important factor in preventing proper and full capitalization of the developments previously mentioned. In certain fields—automotive and enamelling for example—some data have been made public. Engineers and designers are more readily convinced by demonstration than by physical test charts.

Seeds from whence many developments of the last 20 years or so have grown were sown by two men. One, Henry Marion Howe, is known and honored by all ferrous metallurgists. The other, George Koch Elliott, author of the first A.F.A. Exchange Paper, is remembered by but few.

Howe's restless and probing mind delved into nearly every phase of ferrous structural metallurgy. He sought tirelessly to bring about system and order. His direct work in gray iron was limited, but his teaching was clear, his suggestions significant, and his logic relentless. He emphasized the possibilities of (1) and (2) in the above outline of metallurgical progress.

As an experimenter Elliott was far ahead of his time. In exposition he was modest, and overly cautious in hypothesis and speculation. From a practice viewpoint, he was a pioneer in the development of electric furnace melting and duplexing, as under (6) above. His observations on the effects of superheating—as developed by him—are the foundation upon which much under (3) above is based. To the factors of composition and time (then recognized if not well understood) Elliott added temperature above the liquidus. Subsequent publications by others on superheating would fill a large volume. Ideas about undercooling, nuclei, inoculants and the like are logical sequences to the original observations of Elliott.

In the early 1920's specific foundations for much of the subsequent American development in gray iron metallurgy were laid through the close co-operation of a small group of men—among them Ralph MacPherran, Hyman Bornstein, James MacKenzie, Willard Rother, James Vanick and Alfred Boegehold. Efforts were made to evaluate cast iron objectively, as a worthy engineering material, and particularly to get away from the prevailing specifications based on the so-called "quality of iron in the ladle." Studies of structure and mechanical properties showed that composition or analysis is in itself but one factor, and not a suitable basis for selection or prescription.

Explored Many Fields

Rother and Mazurie[1] discussed effects of mass; MacPherran and Harper[2] considered heat treatment; MacKenzie[3] probed the effects of phosphorus on carbon; Vanick and Wickenden[4] discussed the influence of nickel; while Bornstein and Boegehold were active in committee organization, specification formulation and like endeavors.

These and other papers of the early 1920's thoroughly awakened workers to the practical possibilities of scientific approach. There was established a closeness of co-operation, of teamwork, of objective approach, which is retained to this day. Many contributions have followed, adding to our useful knowledge both of the *why* and the *how* of gray iron metallurgy.

There was marked progress in other countries. In Great Britain most of this centered in the excellent work of the British Cast Iron Research Association under the leadership of J. G. Pearce. On the continent Piwowarski and associates were perhaps the most prolific workers. Nor do we forget that splendid Englishman, John Shaw, whose keen analyses, probing criticism and friendly advice were so helpful to all young research workers.

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Use of the electric furnace (direct and indirect arc), duplexing, superheating, large hot blast cupolas, and the production of high strength irons on a tonnage basis, were in considerable degree American achievements, as was also the use of "alloys."

Molding methods, including centrifugal casting, permanent molds and the like, were advanced during this period. Splendid developments were made in sand testing technique. It is significant that the A.S.T.M.-A48 specifications were the first to make provision for classes of commercially available high strength irons, including classes to 60,000 p.s.i. minimum tensile strength.

A "Symposium on Physical Properties of Cast Iron" was presented before the A.S.T.M. in 1929. As stated at that time by Bornstein, "In case of steel, rapid progress has been made during the past two decades in classifying various types of steels and determining their physical properties. As a result the engineer has become familiar with the large range of steels and is able to select a material which suits his particular purpose. There has not been the same progress in the classification of cast irons and the determination of their physical properties. Furthermore accurate information has not been widely disseminated to the engineering profession. As a consequence the engineer frequently has looked with suspicion on cast iron as an engineering material—specifications have not caught up with practices—knowledge as to its properties is necessary to encourage its proper use in industry." A review of this symposium, and especially the discussion is well worth while. A later A.S.T.M.-A.F.A. joint symposium was presented[7] in 1933.

More Data Are Available

Since that time many more data have become available. A considerable portion is contained in the *Cast Metals Handbook*[8]. Despite this, it is evident (and this has been true especially in this war) that the objectives expressed and implied by Bornstein remain too far from fulfillment. It is hoped that the program being presented at this meeting by the Gray Iron Division and made possible by the association and its chapters will prove effective.

Years ago Howe asked "What is steel?" Today a group of earnest workers are asking "What is cast iron?" and are searching out the fundamental mechanisms of structures. As an absolute science we will never know, but as the broad pattern is woven by the skilled labor of many minds and hands, here and abroad, we will understand better the things with which we work, and can manipulate them better to useful ends. Sometimes "practice" may forge far ahead—as was the case with Elliott's superheating. Sometimes "theory" may lead—when certain advantages of lower carbons became apparent, methods were adopted or devised to produce them. But the art and science of foundry metallurgy covers both.

Some 34 workers in the field of structural studies are represented in the *Transactions* over the past 5 years. It is encouraging to note that many of these are younger men. Practical operating methods and engineering developments too have received their share of attention. Some 17 workers are represented in the *Transactions* of 1937-1942.

Beginning in the early 1920's and up to 1930 the writer presented 30 or more papers to several agencies including the association. These sought to demonstrate the practical importance of the graphite flake formations through their size, distribution, and similar characteristics. It was shown that there are relationships between graphite distribution and the position of the alloy in the iron carbon diagram. Some of the effects of mass on structure and on engineering properties were mentioned. A scheme for classification of flake structures was proposed. Direct proof was given that fracture (in large measure) follows the flakes. Influence of total carbon on structure, degree of quasi-isotrophy, and strength was considered.

More purely mechanical questions, such as mechanisms of deformation and creep characteristics, also were studied, along with such problems as the structures of the phosphorus rich constituents, effects of pouring temperature, questions

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In the course of the review preceding preparation of this lecture it was interesting to compare some of these earlier papers with modern ones, such as those delivered before the Association during the past 4 or 5 years.

Today's presentations of other workers are much more refined. They reflect the general advances in science. Better techniques are evident, new viewpoints are brought to bear. Gaps in knowledge are being filled, older findings confirmed or modified. In that period, some 10 to 20 years back, there was but little interest in structural metallurgy. The writer was among those who attempted to arouse interest in the then newer approaches, and often over simplified and avoided details to get the message across. That is no longer necessary. Today even highly technical presentations get a large and understanding audience. Yes, today's presentations are on a distinctly higher plane. Even so it is whispered to a few of the younger workers that wider reading, more extensive bibliographic study, and more effort to gain direct operating experience would not come amiss.

Whatever gray iron is or may be depends upon composition, time, and temperature. In that statement the matter of density or soundness is not neglected, since flow, feed, and solidification are related to composition, time and temperature. Internal stresses also are affected by these factors.

Gray iron is essentially an alloy of iron and carbon. Its properties depend largely upon the amounts and arrangements of the carbides and ferrite in the matrix, and on the degree of discontinuity of the matrix that is effected by the graphite flakes. We start with a certain amount of iron and of carbon. (Discussion of phosphorus formations, inclusions and also consideration of austenitic iron etc. is avoided for sake of brevity). The other elements (major and minor), time and temperature determine the condition of the carbon and hence of the resulting product.

Speaking somewhat broadly for scientific accuracy we might consider many effects of the other elements (including alloys) within the factor time, because they influence reaction rates. Certain ones also change the critical range temperatures, and some notably silicon, alter markedly the percentage of carbon required for the eutectic concentration. Inoculants, gases, and like agents may be included along with the "elements." Directly speaking, time may be considered in terms of rates (as in effects of mass) or, as in heat treatment (even in flame hardening), an elapsed period.

Avoid Unrelated Details

In research it is too easy to get away from fundamental factors and to get lost in a maze of unrelated details. Happily, several among the recent papers in the *Transactions* indicate clear conceptions of the fundamentals. There remains room for more comprehensive and thoroughly coordinated research. Perhaps thorough correlation of work published to date, including the most recent, would be helpful, not alone in indicating the gaps, but in giving a more readily attainable grasp of the panorama.

Your indulgence is requested to permit the posing of one question. Will real control of graphite shape be realized in gray iron?

Its amount can be controlled and considerable information is known about size and distribution. Visualize a material, possessing (as cast) graphite flakes or groupings resembling those of malleable iron instead of groupings of elongated flakes. We are accustomed to accept flake shapes. Such claims as have been made purporting to change them are not too convincing. At most, any accomplishments in that direction are modest.

Dogmatists will say that absolute control of flake shape (or elimination of flake formation) is an impossibility. They will cite many reasons, real or alleged. What is an impossibility? That a thing has not yet been done, does not make it an impossibility.

For example the writer has seen a very uniform graphite structure produced in markedly hypereutectic pig iron. (Fig. 1, gray iron photomicrographs.) None of the large and plate-

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like flakes, or "kish," typically characteristic of hypereutectic iron, could be found even in heavy sections. (Figs. 1*B* and 1*D*.) There was no chill. An iron of almost identical major composition cast into the same pig mold showed the heavy kish flakes. (Figs. 1*A* and 1*C*.) If the characteristic plate-like formation can be modified fully, may there not be possibilities in the eutectiferous and hypoeutectic irons? Commercial exploitation of such products would not be difficult.

It is unfortunate that many have not given specifications (a "measuring stick" of the engineering worth of a product) the consideration they deserve. Too often specifications are viewed as afflictions. A positive and constructive attitude, personal interest, and personal support are needed. If specifications are considered inadequate, there certainly is a welcome awaiting those willing to help in making them better and more useful. If testing methods have shortcomings, or better methods are desired, any technical committee will greet with open arms all who are willing to work.

Select The Proper Class

To get the right iron the customer must select the proper class for his service, on the basis of strength desired and section size involved. A.S.T.M. Specification A48 (first adopted in 1932) offers such a basis for selection and prescription. This specification is well grounded on a basis of careful studies. The British had issued a specification based on the same principles in 1930 or 1931. Both groups had been working along similar lines for several years. The majority of published research data preceding the issue of either specification was of American origin. Several months ago an editorial of the British *Foundry Trade Journal* stated that the preparation and issuance of the British specifications was and is one of the greatest forward steps in gray iron in many years.

A.S.T.M.-A48 and the Federal QQ-I-652 are alike in principle and agree in most details. Similar general principles also are followed in German and Japanese specifications.

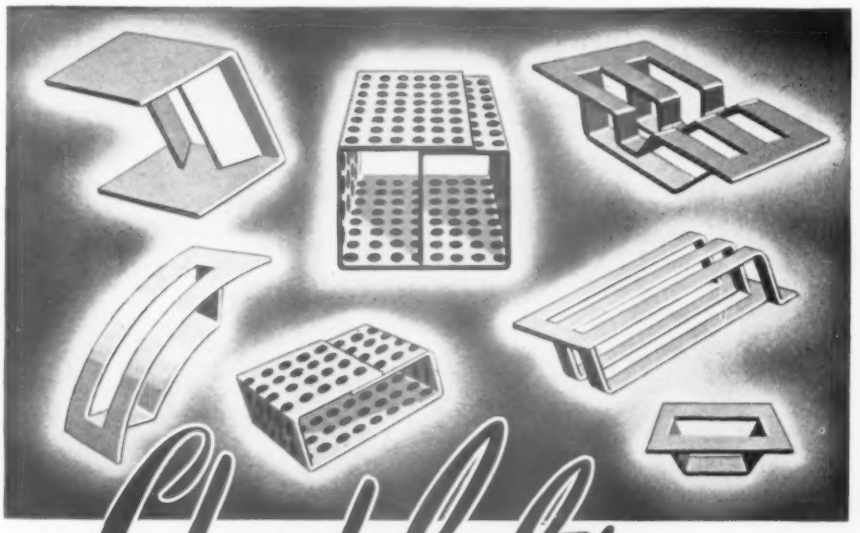
It is not argued that specifications are a substitute for the integrity and skill of the manufacturer. They are supplementary, and of the greatest value as an objective measuring stick, subject to independent tests or other check. Specifications calling for "good grade gray iron," "high class semi-steel" and similar indefinite designations have no engineering significance. Trade names have a legitimate place, but when it is claimed that XYZ alloy is the "missing link between cast iron and steel" and so on and so on, and prescription by actual independent test is avoided, it is evidence of intellectual dishonesty which does not engender confidence in the material in general, however effective it may be in a temporary way and with less informed individuals.

Despite the fact that advances in the foundry metallurgy of gray iron have been considerable, efforts made toward exploitation of the product have not been too successful. Customer confidence that insures product acceptance has not been too well established. Perhaps this is partly true because, in the past, major support for research, and direct conduct thereof has come from captive foundries, from metals vendors, and from universities and similar institutions. With but few noteworthy exceptions jobbing foundries often have not participated directly.

The writer believes that all concerned recognize a need for continued research and development. Perhaps many who would like to participate do not know just how to go about it. They are properly cautious about spending money without seeing clear and effective plans before them. Some perhaps find it hard to visualize the value of research in maintaining and improving the competitive position of an industry.

In supporting work that is of benefit to a whole industry, organizations often find that the ultimate objectives are reached thus most swiftly and surely. Co-operation is not mere altruism, it is intelligent selfishness.

The problems of co-operation challenge all of us, both as individuals and as members of technical and trade groups. The will to do, to accomplish, exists. To crystallize it, to organize it, to lead it, is a task partly done. It well



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can be pursued to a further extent.

Attention should be called to the useful engineering characteristics of gray iron, wherein they are superior to those of other materials of construction. There should be some gentle "debunking" of the comparisons (?) made with some other metals. What engineering significance *per se* has the reduction of area? Directly applied, just what use is one going to make of 30 per cent elongation? What is the value of a minimum of 35 ft. lb. Charpy impact where highly dynamic loading is not met? Such competition, inferring that gray iron is weak, brittle, unreliable metal, hardly indicates constructive selling. It has been said that the designer is "ductility crazy." Assuredly making this property a *sine qua non* is not a balanced approach.

Gray irons are available over a wide range of tensile strengths. Long time tests show that a large percentage of the ultimate tensility is usable—in contrast to the comparatively low limiting strengths—the yield strengths—of many other alloys. The compressive strength of gray iron is relatively high. In transverse loading its rupture modulus is high in comparison to its tensility. It is relatively insensitive to notch effects, which sometimes make quite ductile metals unreliable. Its fatigue strength is a very respectable percentage of its ultimate strength. It possesses unique damping properties. Its non-seizing properties in metal to metal wear are excellent in comparison to many metals. It is hoped that at this meeting many examples of successful applications of gray iron will be made available. A few examples of successful field applications are more convincing than sheets of unsupported statistical data.

This gray iron section of the lecture purposely emphasizes certain broad trends in the industry rather than detailed and specific technical developments.

Technical achievement—and it has been considerable—has not been fully capitalized. Customer acceptance has not paralleled technical advance. War is bringing this fact home most vividly. It is also upsetting many cherished practices. Profligate usages of materials, and employment of uneconomical methods have been curbed. Adaptability to new conditions is necessary for survival. Gray iron has had and will have a considerable place in our industrial economy. Its merits are not fully exploited. This does not say that the same foundries will make the same product the same old way—far from it. It indicates that as "water finds its level" so in the long run a material of construction finds that field of acceptance for which it is best adapted. The time lag or lapse can be greatly shortened by seeing to it that the story is properly and promptly told to the consuming public. The Gray Iron division has been and will continue constructively helpful in promotion of the best interests of the castings industry. This group is relatively large, it is active. Happily it includes a number of young men along with the "old timers" in its membership. Much has been done. That which remains to be done stimulates the interest and challenges the ingenuity of all.

(To be continued next month)

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American Standards Association, 29 West Thirty-ninth street, New York, has issued a 20-page list of its standards. More than 600 standards are listed by subject and relate to civil, mechanical, electrical, chemical and other engineering fields as well as metals and materials.

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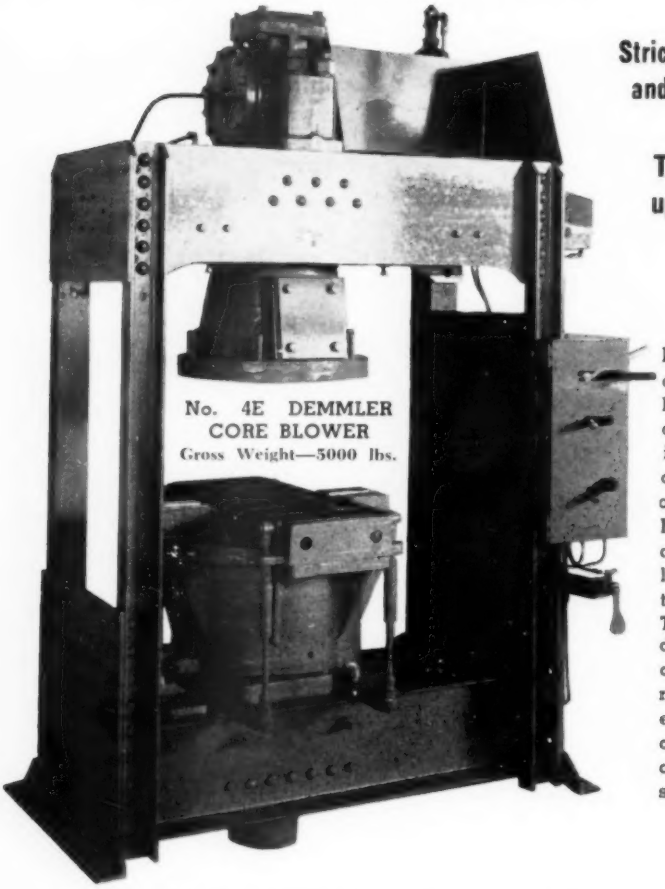

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CORE BLOWING PRACTICE

(*Concluded from page* 88)

that all sand entering between the fins would travel in a straight line. This precaution was taken to prevent the sand from striking any of the fins from an angle, as this would produce a cutting action and cause unnecessary wear. A row of vents was installed completely around the pattern underneath the fins.

It was assumed that these vents would hold fast the first sand entering the box, thereby providing a cushion for the remaining sand. As additional sand entered in a straight line down the jacket wall, it was forced between the fins, rather than being blown directly on them. A certain amount of air would have accumulated prior to the time the sand has reached the extreme top of the pattern. A series of vents were installed in the underneath side directly in the center of the jacket to provide an outlet for the air, allowing the sand to flow with enough force to get a solid ram.

Select Proper Sand

Our next problem was to mix sand which would perform satisfactorily. Several mixtures of sand were tried and an accurate record filed . First, the sand must have considerable flowability; second, it must have green strength of at least 1 pound to withstand handling; and third, the sand must be held at 2.8 per cent moisture content, with a dry permeability of approximately 70. It must break clean, leaving none of the fins adhering to the pattern.

With the required sand mixture determined, we next considered the removal of the core. The ordinary amount of vibration used in most shops making these heads is not sufficient for blowing practice. We milled through the bottom of the pattern plate and fastened directly to the main body of the pattern a one-inch vibrator. Two $\frac{5}{8}$-inch vibrators were attached, one to each of the rocker arms. The cores of Fig. 16 are illustrative of the results obtained to date.

When discussing core blowing operations and the rigging of core boxes for them, the question often asked is, "How many vents and what sizes should be used?" Several attempts have been made at setting some standards for this practice. However, none of these, to our knowledge, has been successful to date. The correct sizes and proper locations must be determined by considering the size of the core to be blown, the contour of the box cavity and the kind of sand mixture to be used. The former is determined through experience and the latter depends on the fineness of the sand. There are several kinds of air vents on the market. In most cases where a high permeability sand is used, a vent with 0.015-inch openings is recommended. Vents with 0.010-inch openings for sands with a lower permeability can be used.

The number of blow-holes to be used and their sizes also create considerable discussion and numerous differences of opinion. The required number of blow-holes and their sizes depend to some extent on the amount of air pressure available. Lower air pressure requires greater vent and also blow-hole area. Higher air pressure requires less of each. In either case, vents must be used in correct proportions to blow-holes. Shape and size of the core to be made will be the determining factor. For instance, if a bulky core is being made which must dry on a flat plate without a core drier and with close tolerances to be held, the sand used must contain considerable green bond. The speed and force with which a core should be blown to get the desired results depends on the supervisor's good judgment which he can acquire with experience.

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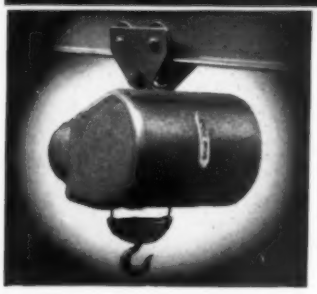

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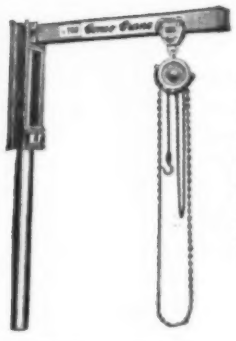

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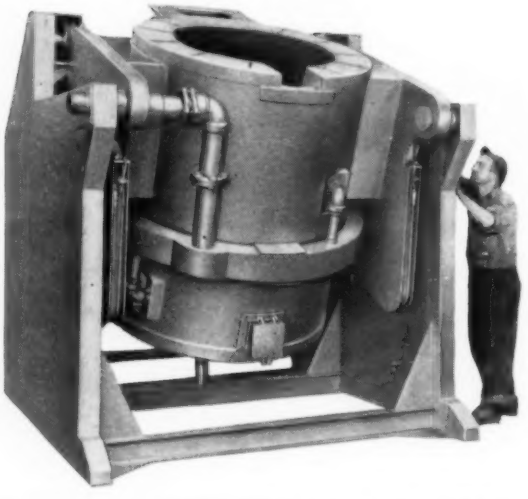

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EDUCATION AND THE GRAY IRON FOUNDRY

(*Continued from page* 83)

sorry wreck? All types of machinery for almost any purpose, moving parts involving piston rings, signal systems, chemical receptacles, communication systems, dynamos, motors, toys, athletic goods, what can you think of that would not be an unworkable tangle without its gray iron?

"Boss" Kettering used to say "What would chairs look like if peoples' knees bent the other way?" This question is not so fantastic as those I have just asked.

And yet, because each foundry caters to but a microscopic part of the great range of industry, each gages the whole by the part he affects and is so guided in his thinking.

In our recent campaign for a publicity and educational fund one member of our association replied "We are not interested in finding new uses for gray iron castings and do not feel justified in contributing funds to this end!" With such an outlook on the industry is there any wonder that there are difficulties in promoting either educational or publicity programs for the industry?

Should Create Interest

A few years ago our society canvassed all the technical schools in the country with a view to ascertaining what, if anything, was being taught along the lines of the gray iron foundry. We had best pass lightly over what was disclosed as it was lamentable except in a very few instances. But if what Dean Freund says is correct there is no demand for technically trained men in the industry. This would seem to lay the baby right in the lap of the trade association to create the demand in the belief that our educational institutions would then rise to the occasion. Certainly it would appear to be the association's job to create the interest, demonstrate the value and go some distance toward providing at least part of the facilities.

A few years ago a manufacturer of welding apparatus, who alone spends a quarter of a million dollars a year in propaganda, sent a sales engineer to Texas to read a paper at one of the state supported educational institutions advocating the substitution of welded structures for gray iron castings. One of the 65 gray iron foundries in that state sent us a protest. As there was hardly carfare for a round trip to Texas in the treasury at that time any steps taken had to be by mail. We at once wrote the dean of the college, pointing out the extremely controversial nature of such a subject and the probable objections that would be raised by the 65 Texas foundries whose taxes helped to support the

institution. We also drew attention to the manifestly commercial nature of the proposed talk. Then we wrote each foundry in like vein urging them to protest to both the college and their legislators.

What happened? Nothing, not a single acknowledgment. The Yankee commercial carpet-bagger got away with the bacon, poisoned the minds of the student body and the foundrymen continued to cut each others' throats at 2 cents a pound.

Today four of the 65 foundries in Texas belong to their national trade association and their united annual dues would not finance an exploratory expedition to disclose some of the reasons for this train of thought.

Another curious phenomenon which has come to our notice is that, of all the college-bred men who have become eminent in the industry, with the exception of those whose fathers educated them to succeed them in the foundry, we have yet to meet one who, while in college, planned a foundry career. In every instance with which we are acquainted they drifted into the foundry for no particular reason.

Castings Are Necessary

This would seem to indicate that the colleges and institutes are not painting the industry in very glowing terms. Perhaps the necessary gloomy, smoky aspect of the foundry coupled with the foundryman's indifference to the formally educated is conducive to neither glamor nor enthusiasm. But let's look at it this way.

Despite pessimism within the industry itself, huge quantities of its product are consumed annually. For many uses to which it is put there are at present no developed substitutes. Say what you may, gray irons possess many valuable engineering qualities not found in other materials. Time was when the young man starting out in life selected his calling and spent his life at it. Today, with nearly every profession and branch of engineering crowded to the gates, we find the civil engineer graduate in the filling station and the mechanical engineer guiding the destinies of a soda fountain. Is there not exceptional opportunity, as opportunities go, in an industry where at least 90 per cent of your competition is either self-educated or lacking sound technical education—an industry which in 1942 sold a billion and a half dollars worth of its product?

It may be true, as Dean Freund states, that the foundry executive is not waiting at the graduating exercises to lay the red carpet to his foundry door, but you cannot tell me that a young man with real intestinal fortitude and determination can go into any halfway decent foundry armed with sound metallurgical knowledge and fail to rise to a position far in advance of his classmate who chose the white collar route to medicine, the law or running a transit for the city engineer. The records of the Gray Iron Founders' Society's employ-

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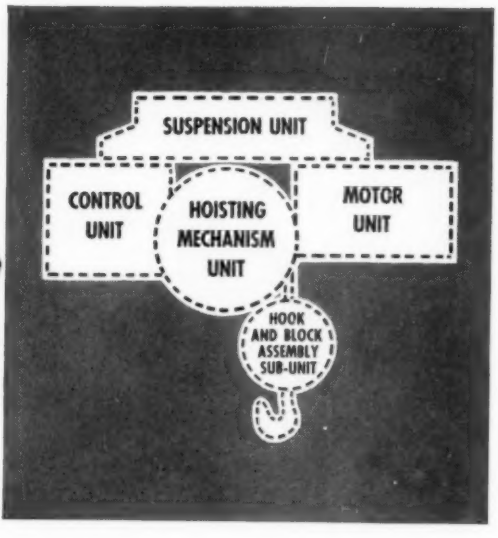

To find out how the READING UNIT CONSTRUCTION PLAN can be put to work in YOUR plant ask for a copy of "Modern Materials Handling Magic". This 16-page booklet can do a lot to help you boost output and simplify hoist maintenance.

• Here is a practical way for you to select electric hoists engineered to meet your specific needs. Yet this "special equipment" costs no more than standard type hoists.

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READING CHAIN HOISTS-ELECTRIC HOISTS OVERHEAD TRAVELING CRANES

ment bureau gives that the lie.

A few years ago one of our outstanding foundry presidents undertook an experiment. He used the method employed by the big corporations and selected a few outstanding young technical graduates prior to commencement and employed them for a "loopers" course in his foundry. He started them in on the foundry floor and then continued them from department to department as they showed signs of sufficient efficiency. When they wound up in the cost department of the office, they were ready to go out and sell the foundries' product on its merit without having to telephone the office to know whether they could cut the price a quarter of a cent to meet competition. They were selling a product that they knew, not just pounds of metal.

A year or so later I asked my friend what these men had cost him. "Not a damn nickel" was the reply. Their sales knowledge had more than compensated for the outlay. Uncle Sam has them now but that is Mr. Shickelgruber's fault, not their employer's.

Dean Freund lists some replies to the question "Why have you or why have you not, considered a foundry career?" It might pay to give each a thought:

The first is: "It seems that foundry work requires more practical experience than anything else, and a technically trained man would have less opportunity than one who worked his way up."

Various Replies Listed

Blindfolded 30 years from now I'll bet you will find the man who gave that answer parked behind a pair of thick glasses in a teller's cage of some country bank at a possible salary of $180 per month. You and I both know the breed. They expect the red carpet at graduation and the closest they ever come to it is manufactured into a pair of slippers. That type would be of no value to a foundry nor to many other vocations I can think of.

Number two is: "No foundry jobs were offered to us." Now it is true that great corporations go through the graduating classes, select those interviewed who seem to have something on the ball, hire them at sub-standard wages and, in a year or two, throw all overboard except the cream and replace those thrown out with a fresh crop. It's a cheap way to secure educated semi-skilled help. The foundry has not thought of it yet and it is still believed that it would pay the young engineer to seek the job rather than stagger into an off-used cobweb where he may find himself back at the starting post after a year or so.

Next reply is: "Our foundry course is a laboratory course, not an introduction to a career. It is accepted by most students as one more required course. It introduces a student to normal labor methods, and they are not important for him." This reply strikes me as a combination of shallow thinking and dementia praecox. Most laboratory courses are an introduction to a career. The idea of

"one more required course" can be laid directly at the door of the instructor. When I went to West Point we too had so many courses to pass. We had to pass all of them all of the time, but the one thing that was never mentioned was the fact that we might some day find use for the things we were studying. As a regional manager for the Frigidaire Corp., I found many graduates of excellent schools who were surprised to learn that if they wrapped up their ice in newspaper they might save the ice, but it was the melting of it that gave them refrigeration. Oh yes, they learned it at school but it never occurred to them to apply such deep knowledge to a smelly family ice box.

As to the remark that manual labor methods are unimportant to a student, does that not speak volumes for the class of thinking to which this student has evidently been exposed during his academic life? Were I a professor, I should dislike extremely to quote it. America was not built by such men nor can they maintain it at its present standards. Shades of Charles M. Schwab and Walter Chrysler!

A few years ago I was privileged to address a group of foundrymen at the state university of a well heeled state. The professor in charge of the sessions took me to see their new student "union" or club. The depression was still on.

Luxury Breeds Laziness

Now gentlemen my business of earning a living has taken me all over the world. I have lived some 4 years in the Far East, 5 years in India, 6 in Brazil, a year and a half in Europe and have traveled extensively in other lands. I have seen the famous Jockey Club in Buenos Aires, belonged to the Jockey Club in Rio de Janeiro, the Bengal Club in Calcutta and visited many other similar establishments in this and other countries. Never, in all my experience, have I seen such magnificence and luxury as I saw in that students' union. The furniture, the drapes, the rugs, the ballroom, a post office, the finest bowling alleys—all on a scale that made my eyes pop out. And as I saw the louts in heavy boots and sweaters and the blowsy female student associates, feet on priceless tables and chairs and dancing listlessly about that ballroom to radio music, it made my heart sick and my stomach sour. What were these children to think when they faced their first prospective employer and their first job? Go to Washington and you will find them—seeking the rainbow of "security". Defeatists and escapists, ready to sell the spirit of adventure and ambition for a clock-watching job on a small salary, hiding behind the skirts of the Civil Service Commission. Watch them pour out of those public buildings when the clock strikes, to return via a drug store meal to the social security of a hall bedroom. They need no fire drill. They have it twice a day and the watchmen can tell you how soon after the bell rings they have the building to them-

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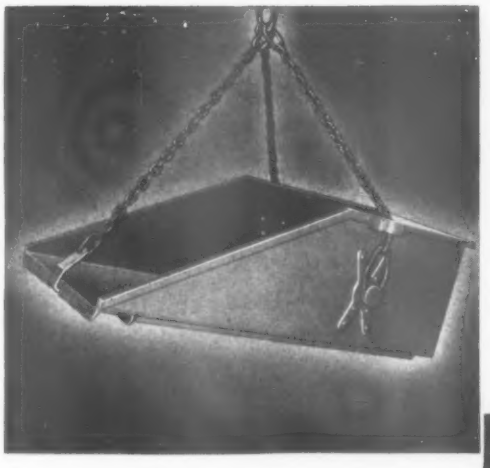

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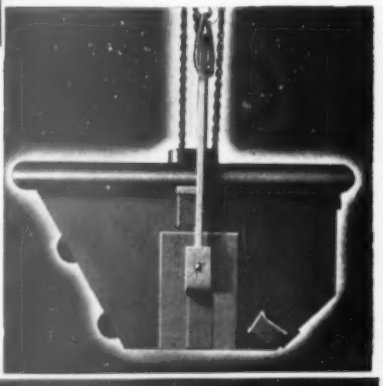

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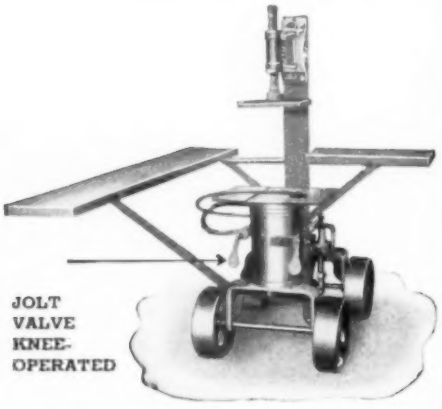

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selves. Good work, bad work, it makes no difference. The pay check goes on just the same and it takes pretty nearly a violation of the entire Decalogue to fire one of them over the protest of his or her senator. You can read their lives in their faces.

So much for that answer.

Next we have: "I never saw any literature about the foundry industry."

Now here is something cogent and sensible. It is an indictment pure and simple of the foundries and their trade association. It is a true indictment and must be remedied.

When the Gray Iron Founders' Society opened its war office in Washington, I was simply appalled to note the number of officials encountered on my rounds of offices who asked the question "what *is* gray iron?"

Finally, in desperation, a hurry call was sent out to our members for pictures of what they made and of the articles these castings were a part of. I planned to make up albums to answer the question.

Now here is a confession. I had then been employed by the industry for six years, but until those pictures poured in I was totally unaware of the Romance of Gray Iron, the picture of coverage I tried to show you a little earlier. I did not know how civilized industry absolutely depended on it. I never dreamed that it went all the way from huge steel industry machine frames to a tiny part in the selector of an automatic telephone switchboard.

Tell the Public

That story must be told far and wide and it is up to the Gray Iron Founders' Society to tell it. Not only is it necessary that it reach the student, but the general public as well else, in their ignorance, those who guide our governmental and industrial destiny may some day, somehow, unwittingly commit acts which would hamstring a huge but little known industry without which, in its present state of development, the civilized world cannot exist.

The next answer: "I don't care for all the dust and dirt" reminds me of a rather dainty classmate of mine at West Point. Monkey drill on horseback during the extreme summer heat of Hell on the Hudson is a sweaty and somewhat dusty affair. After one of these performances Jack, on his way back to the showers, remarked: "I don't like this work in the summer. It get's my horse's fur all wet and nasty."

Leaving these student remarks gained by questionnaire, I should like to move to the final one quoted by Dean Freund in his paper. It is that of the recent graduate of Dartmouth who refused to consider anything but a foundry career. When his determination was challenged he replied: "I know that. It's my point exactly. If I go into the foundry, I will not have to compete for promotion and opportunity with half a hundred other college graduates who have had as good

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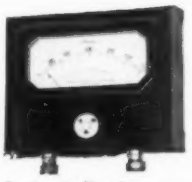

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training as I have had. I should get on faster there."

That young man had the answer. Just compare the chance that a young man entering the electrical, manufacturing, utility, automobile, aircraft or chemical industries has compared with entering a medium-sized foundry where the officials are getting on in years and perhaps have no one with vision beyond the cupola in their employ.

I am sometimes surprised to learn the number of my parishioners who seem to be in Florida during bad winter weather although claiming that they can't make any money. In other industries you only find the stratospheric big shots on the beach. I am not yet convinced that the foundry industry is either starving or obsolete.

But let's get down to dots.

What are you going to do about this situation and what is the foundryman or rather his trade association going to do? Assuming the hypothesis that the teacher is eager to produce tangible results and the trade association is what it purports to be, namely, a non-profit organization maintained by the members of the industry for their business betterment, it would appear that we have mutual interests and responsibilities.

Owing to the fact that those who should reap the real benefits are unaware that they exist or could be beneficial, the way is not easy, but nothing really worth while is easy.

Four Classes To Educate

Properly expended money always seems to lie at the root of success, and the contacts I have made with educators interested in advancing the gray iron foundry cause leads me to believe that they are not suffering from surplus financial facilities. By the same token the national trade association, the Gray Iron Founders' Society, is neither pursued by bequests nor would-be-members.

Our experience with the war agencies in Washington has taught us the painful lesson of how little known and lightly regarded our great industry is. We sold the necessity for education and publicity to a very active and able committee who set out to raise $25,000 as a fund to commence the work. This they have accomplished after a hard and vigorous campaign. One would think such a sum ridiculous and easy to obtain in an industry whose sales exceeded a billion and half dollars last year, but it was neither. However it is a beginning—a quite large beginning when you realize that it exceeds the entire annual budget of the year and present management took over. Since our industry is neither education-minded nor publicity-minded as yet, extreme care must be exercised to insure that every penny is made to count and that those who gave are made aware of it.

We then have four classes of people to educate. First there are the foundrymen themselves who must be made aware of the necessity for making their plants a more desirable place to work in

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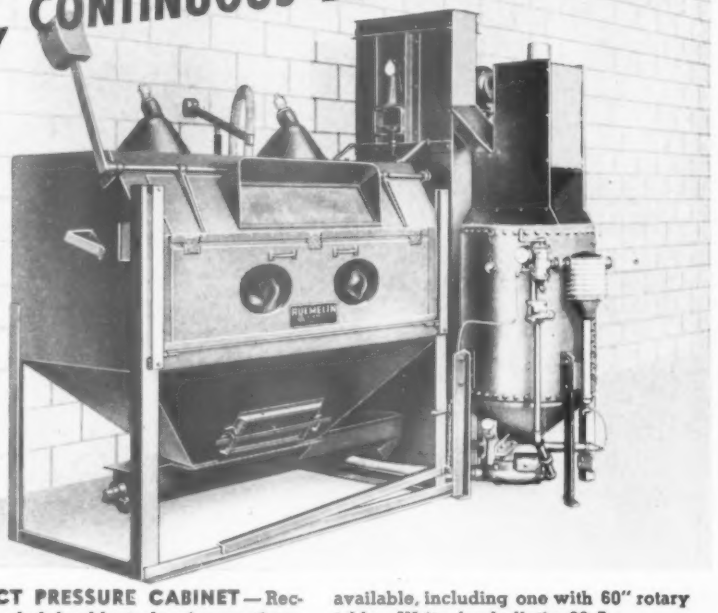

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(good housekeeping), of the value of introducing technically educated men into their plants for both operation and sales, of offering adequate inducement to attract such men and finally of the value of publicity.

Second, there is the job of showing embryo engineers the prospects a foundry career holds out to them and then give them a sound fundamental education in the art so that they may make good and disappoint neither their employer nor themselves.

The third job is to give the engineering classes in schools and societies a better knowledge of what gray iron is, how it can serve them and its limitations. These men are the consumers of today and tomorrow. They must know so they may buy.

The fourth class is the general public. To take them on seems fantastic to the foundryman, but we have learned their value in Washington. Here we are confronted with lawyers, economists, chemists, men of every persuasion who often hold our destinies in the palm of their hand. The government, of course, is all-controlling today, but even with the coming of peace it is doubtful if their long arm will be shortened for years to come and we must make them as much aware of our importance as they are of plastics, steel, electronics, etc.

Enlist School Aid

Today, due to the dislocations caused by war, little can be done at the schools since we understand that Uncle Sam has largely appropriated their facilities for his own use. But we can get to know their staffs better and plan for talks to classes of both a popular and technical nature to fit into their curricula when normalcy returns.

In the meantime we can gradually sell the idea to the foundrymen of taking educated young men into their plants and fostering their advancement.

We can prepare and place at the disposal of engineering bodies talks on gray iron as a solution to their problems.

We can make informative literature available to schools and provide ready reference handbooks for the engineer.

We can have technical papers prepared for publication in trade or technical journals.

And, last and of possibly least importance, we can indulge in commercial advertising and encourage and assist the foundries to do likewise.

Some day, perhaps, (and say it in whispers), our great industry may so awake as to assist financially in the establishment of proper laboratory or other educational facilities in one or more technical institutions. That seems far in the future but "The sun do move" and miracles have happened.

This all seems like a tall order for the Gray Iron Founders' Society but we have undertaken seemingly hopeless tasks before and gotten away with them. We believe that if we can secure academic co-operation and understanding the job can be done.

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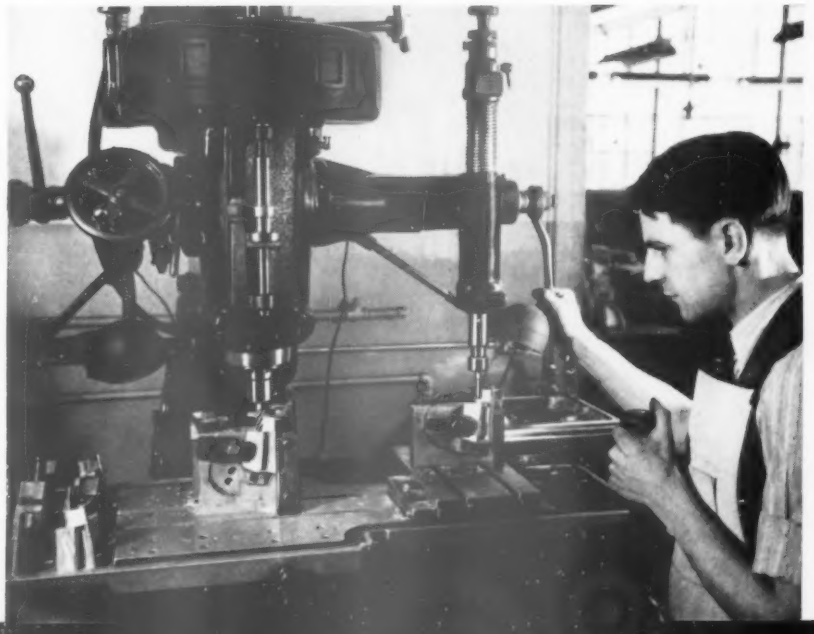

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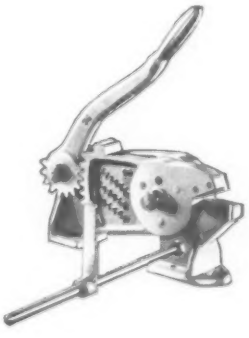

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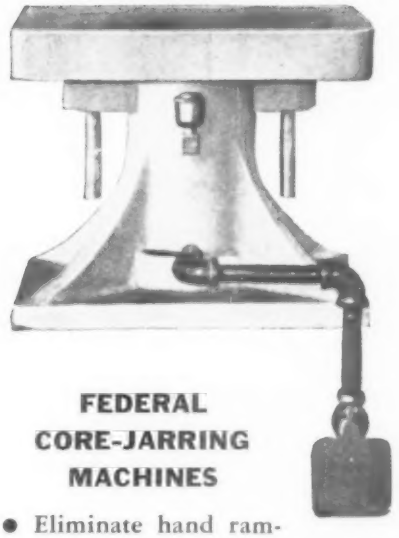

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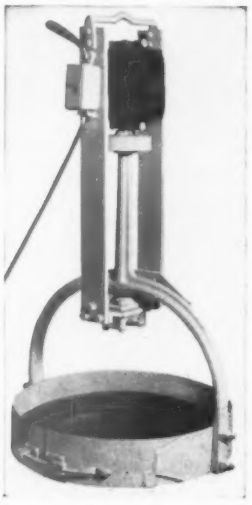

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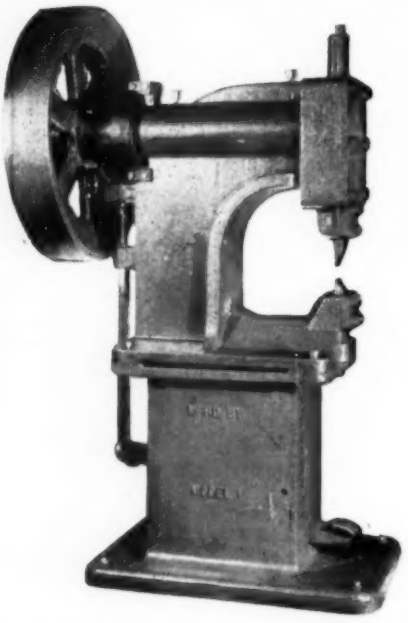

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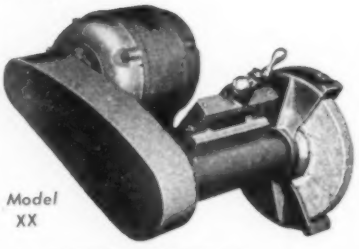

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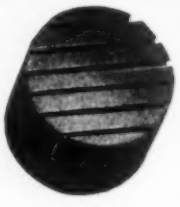

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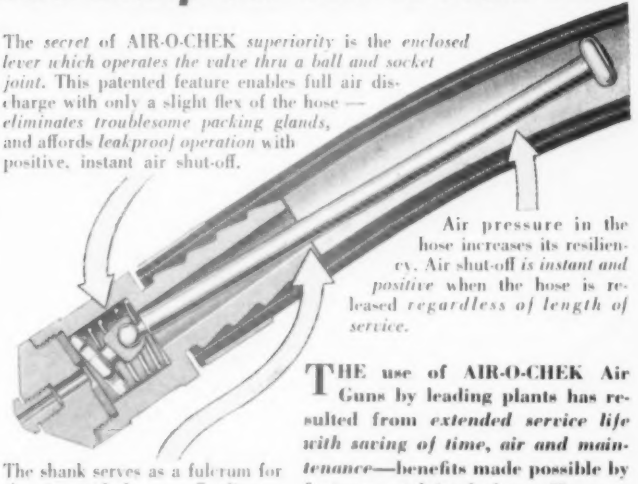

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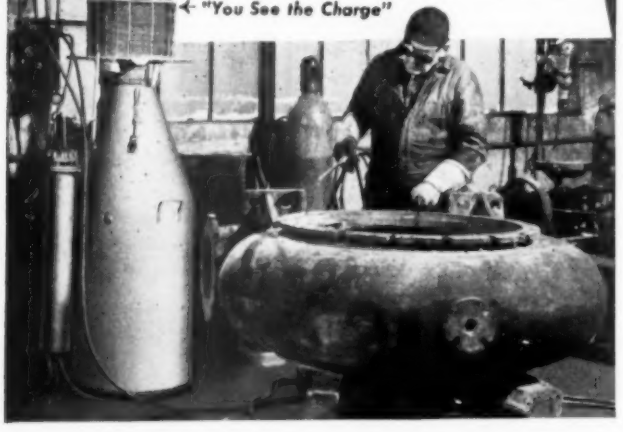

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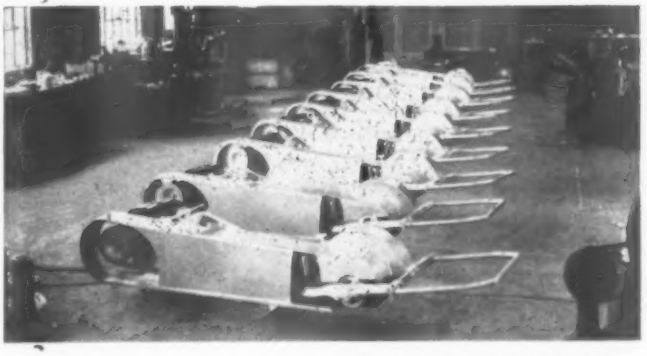

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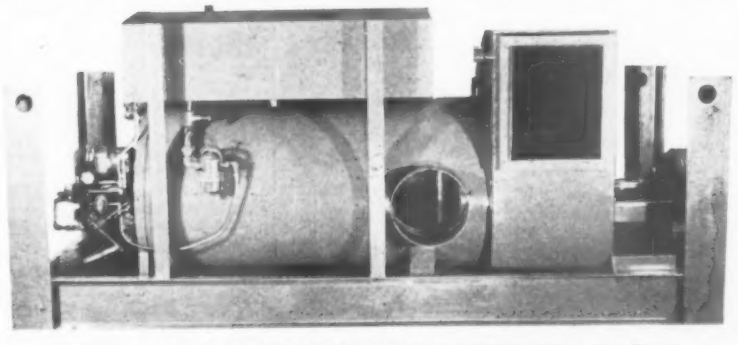

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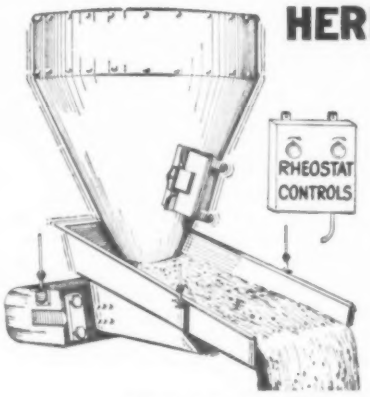

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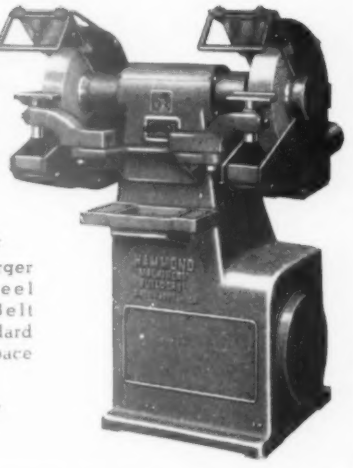

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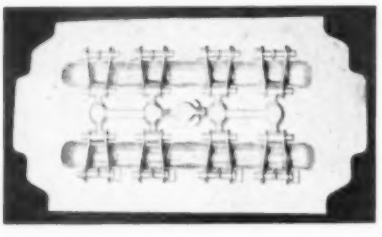

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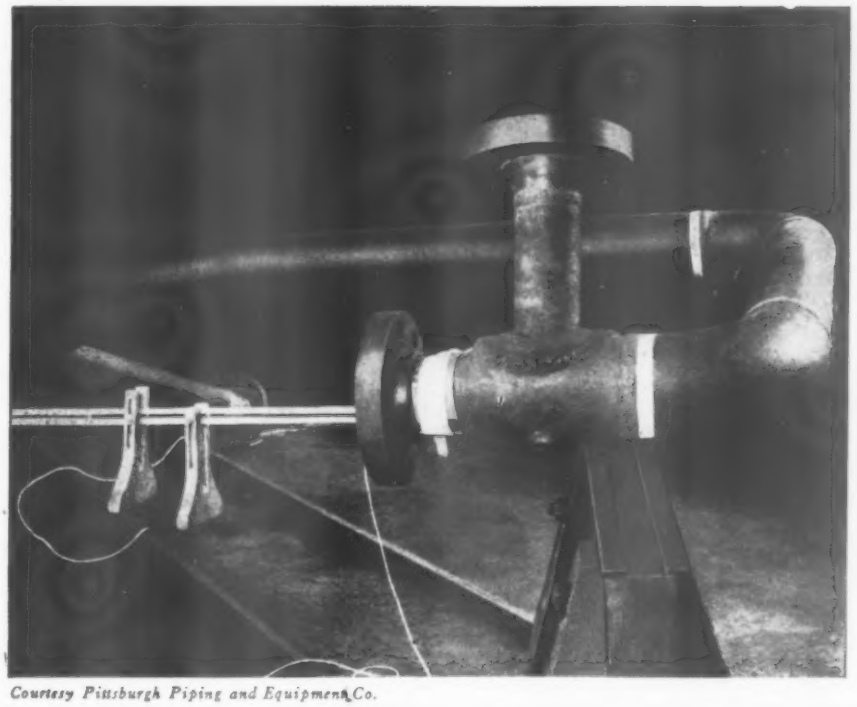

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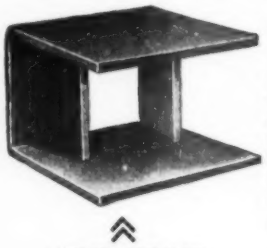

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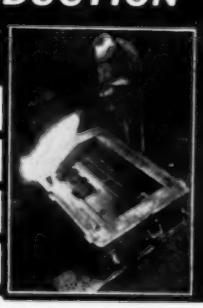

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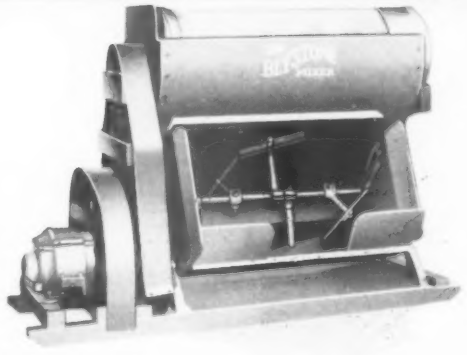

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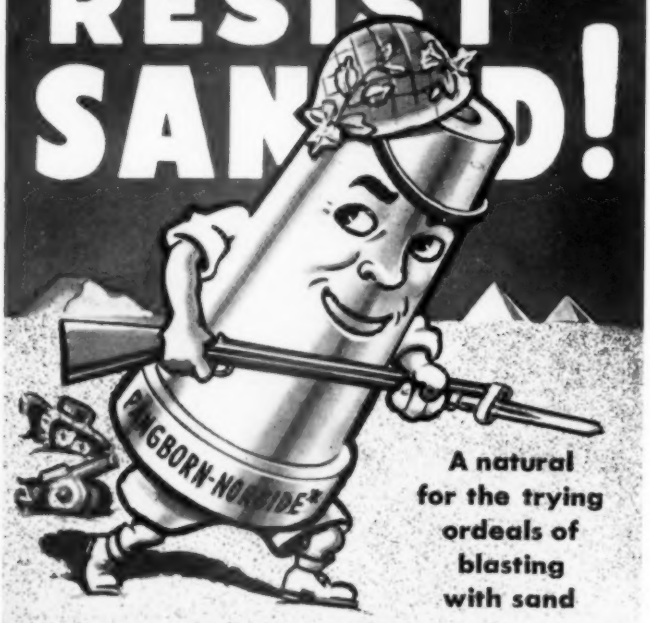

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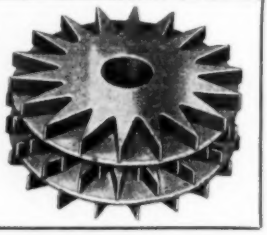

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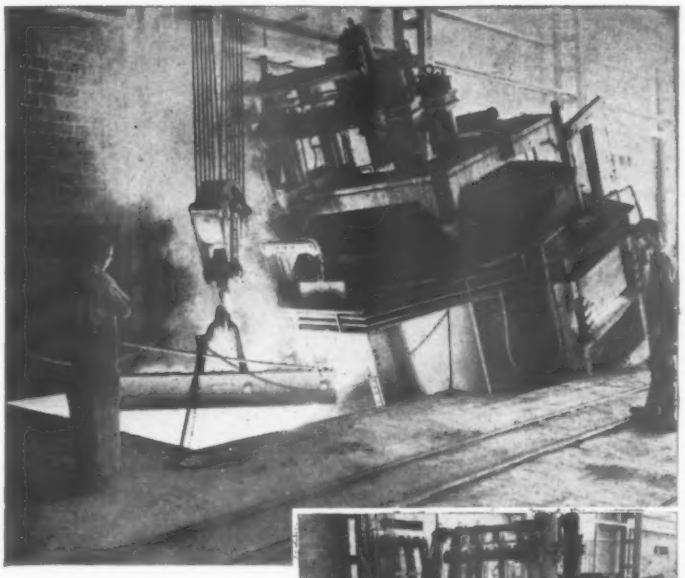

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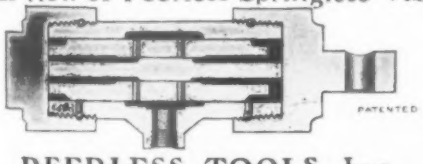

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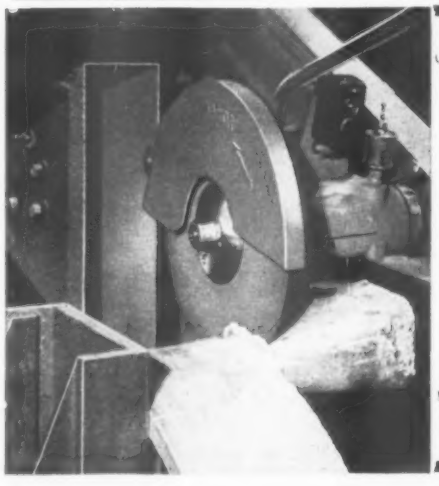

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Twenty-three years' practical experience small gray iron jobbing shop. Foreman. Charge of production, sales and purchases. Castings from one lb. to three tons. Green and dry sand. Address: Box 172, The FOUNDRY, Cleveland.

SALESMAN, GRAY IRON CASTINGS

Knows costs and able to quote prices intelligently. Twenty years' practical experience. Prefer Ohio or Michigan. Address: Box 170, The FOUNDRY, Cleveland.

SALESMAN

Twenty years' practical experience. Wishes position foundry supply sales. Sales experience—willing to relocate. Address: Box 173, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT

Married. Fifty years of age. Technical trained metallurgist. Twenty years' experience as foreman and superintendent. Practical cupola operator. Understand green and dry sand control. Experienced on heavy and light jobbing, motor casting and pressure casting work requiring high strength iron. Address: Box 995, The FOUNDRY, Cleveland.

MAGNESIUM FOUNDRY SUPERINTENDENT

Three years' experience in establishing, controlling and supervising quantity production of aircraft magnesium castings. College graduate—metallurgical engineer. Five years practical foundry experience. Wide knowledge of mass production equipment, newest magnesium foundry methods, sands, inhibitors, laboratory test methods and cost estimating. Good trouble shooter. Capable of taking complete charge of foundry and laboratory. Open for position on salary and percentage based on tonnage. Address Box 154, The FOUNDRY, Cleveland.

Foundry Work Wanted

WANTED
FOUNDRY & MACHINE SHOP WORK

MT. JEWETT FOUNDRY & MACHINE, INC.
MT. JEWETT, PA. PHONE 2371

Employment Service

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

SALARIED POSITIONS

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

Wanted-To-Buy

WANTED

Production patterns for sash weights. State condition and price in first letter. Address: Box 158, The FOUNDRY, Cleveland.

Wanted-To-Buy

WANTED

Three phase Heroult Type Electric Melting Furnace. 1000-2000 lbs. per hour melting rate. Desired current characteristics—3 phase, 60 cycle, 11,500 volt. Will consider other primary voltages. In replying give name of furnace manufacturer and year built, also name of transformer manufacturer and serial number of transformer.

THE DURIRON COMPANY, INC.
BOX 1019 DAYTON, O.

WANTED

Two No. 333 Osborn Jolt Roll-over Squeeze pattern draw molding machines with swing-out table.

Two No. 433 Osborn Jolt roll-over Squeeze pattern draw molding machines with swing out table.

Frank Foundries Corp. Moline, Ill.

WANTED

6,000 C. F. M., 16-20 oz. centrifugal cupola blower direct connected to motor. Motor specifl. 3/60/440.

ST. PAUL ENGINEERING & MANUFACTURING CO.
FORMERLY ST. PAUL FOUNDRY
500 COMO AVENUE ST. PAUL, MINN.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

WANTED

Ingot mold conveyor. Small ingot size. Give price and capacity. Address: Box 137. The FOUNDRY, Cleveland.

Foundry for Sale

FOR SALE

Completely equipped foundry and stove factory on railroad siding, now in operation located in mining town in Northern Mexico. For particulars address: F. P. Low, Apartado Postal 3, Parral, Chih., Mexico.

FOR SALE OR LEASE

Gray iron foundry for castings up to 5 ton in Southern New Jersey. Approximately three acres of land. Low tax district near Philadelphia. Address: Box 136, The FOUNDRY, Cleveland.

FOUNDRY FOR SALE

Small but fine foundry for sale in Reno. The only one in the state of Nevada operating for customers. Excellent profits guarantee. Selling on account of army service. Address: Galli Foundry, Reno, Nevada.

FOR SALE

Electric Steel Foundry equipped to make castings ¼ pound to 6000 pounds. Building constructed of steel brick concrete also fire proof pattern storage and pattern shop. Foundry modern and equipped for production, now working 100% defense with orders on hand for many months. Clientele A-1. Reason for selling, ill health. This proposition will bear investigation. Address: Box 121, The FOUNDRY, Cleveland.

Classified Advertising

Foundry Wanted

WANTED

Small gray iron foundry. Equipped to handle castings 100 lbs. to three ton range. Prefer Ohio or Michigan. Address Box 171, The FOUNDRY, Cleveland.

WANTED

A small foundry within fifty miles of Pittsburgh, Pa. The only equipment required in the plant would be a cupola with blower and controls. Submit price and complete details. Address: Box 157, The FOUNDRY, Cleveland.

For Sale

FOR SALE

POWER PLANT

1—Fairbanks, Morse, 120 H.P. Stationary Diesel Engine, model 32B-2, two cylinder, 14 x 17, with tanks, etc.
1—Type AB 50 KVA 1200-3-60-240 Belted alternator.

FOUNDRY EQUIPMENT

1—12 x 14 Ingersoll-Rand ER-1 Air compressor with extra heavy air tank
1—No. 5 Bartlett Foundry & Machine Co. Brass Melting Furnace (COKE)
1—30" x 42" Tumbling Mill (Sly Mfg. Co.)
1—6B Volume Champion Exhauster

HINES ALUMINUM TAPERED SNAP FLASKS & JACKETS

1—15" x 24" and 12 jackets
3—12" x 22" and 18 jackets
2—11" x 22" and 12 jackets
1—17" x 19"

MISCELLANEOUS

2—"Skinner" Drill press vises
1—No. 2 Hosfeld Universal Iron Bender

REPLY

CARLISLE FOUNDRY COMPANY
CARLISLE, PA.

FOR SALE

One Tumbler in good condition size of drum 3'-0" x 4'-6". Available immediately. Reply: Memorials Art-Crawford, Inc., 1875 Main St., Buffalo, N. Y.

EQUIPMENT IN STOCK

GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—No. 60 Crucible Fisher Stationary Furnace, oil fired with new lining and cover.
(2)—1¾" cap. Shuster Power Sprue Cutters.
(4)—Large Flask Vibrators.
(1)—8-ft. Diameter Simpson Sand Mixer.

AIR COMPRESSORS & BLOWERS

(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.

ELECTRIC MONORAIL HOISTS

(30)—¼ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 220/440-volts, 3-PH. 60-CY. 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1)—To 50-tons cap. 18'0" to 91'0" span, 220/-440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 CLARISSA ST. PHILADELPHIA, PA.

For Sale

FOR SALE

1—Chicago Pneumatic Air Compressor 12" x 14", 75 HP, switch box and starter, complete for operation, $100.00.

1—10" x 10" Bury Air Compressor, 40 H motor, switch and starter, $900.00.

1—G. H.-2 Pangborn Sand Blast Barrel, complete with air tank, elevator, hopper, $200.00 worth of new parts, $900.00.

1—275 gal. Fuel Oil Tank with Oil Pump and motor, $250.00.

1—Howe Portable Platform Scales, 4 ft. square platform, $225.00.

This equipment has all been rebuilt.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO, MICH.

FOR SALE

NEW PENNSYLVANIA TRANSFORMER CO. ELECTRIC FURNACE TRANSFORMER

Type 01WC — Serial No. 3147-1
Spec. 2166 — L. V. Amps 4030

11 Gal. Water Per Minute
3 Phase 60 Cycle, 55° C. Rise
Voltage 23,000—215

Ready for immediate shipment.
This transformer has never been used.

Reply

P. O. BOX 897 YOUNGSTOWN, OHIO

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

FOR SALE

One 83" Buffalo Cupola Blower, belt driven to deliver 8000 CFM against 14 oz. pressure. Used less than a year—in excellent condition.
Also two used Cupolas, 1—74" Whiting and 1—34" Whiting. Reply: A. J. LINDEMANN & HOVERSON CO., 601 W. CLEVELAND AVE., MILWAUKEE 7, WIS.

REBUILT

BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
406 N. Peoria St. Chicago, Ill.

NEW LADLE FOR SALE

Whiting standard 48—½" top diameter, bottom 3-p. geared crane ladle. Capacity 10,000 lbs. Has "EZ" Pour Tilting mechanism with automatic brake and positive forced feed lubrication. Has never been used.

REPLY

P. O. BOX 897 YOUNGSTOWN, OHIO

FOR SALE

1 Battery of three Coleman Double-End Transrack Gas Fired Core Ovens, complete with Heat control. Rack size 40" wide x 52" long x 68" high. Good condition. Price reasonable. Address: Box 127, The FOUNDRY, Cleveland.

FOR SALE

1"—Used Electric Steel Furnace Complete with transformers. 12,000 volt primary automatic electrode control etc. Purchased new May 1942. Has been producing 7 tons daily. Can make shipment within 3 days. Price f.o.b. shipping point $55500.00. Address: Box 161, The FOUNDRY, Cleveland.

For Sale

SPECIAL DEFENSE BARGAINS

Cast Iron and Steel Plate Mill-Dust & Shavings Exhausters 50 in stock. **Cupola and Furnace** Blowers for Coke, Oil or Gas Combustion.
Brass Foundry Furnaces: No. 3—60" class C Schwartz. No. 2—42"—class A Schwartz, with or without blowers.
Two Monarch Rotating Barrel type furnaces each 500 lbs. per heat capacity, one newly carborundum lined.
1—Hausfeld 400 lbs. per heat capacity, complete—newly lined and with Electric Blower set attached.
1—Booth Electric Furnace with accessories 725 lbs. cap., with new unused extra cylindrical lining.
Can furnish stationary furnaces on short notice for crucibles No. 60 to No. 125 with swing top covers.
Molding Machines: 1—Osborne No. 75-J portable
1—Arcade portable Jolt Squeeze, for 12" x 18" flask.
3—Battenfeld jolt, squeeze plain or pattern lift or strip—platens 18" x 32".
2—Stationary Adams Squeezers 32" between strain rods.
2—Stationary Adams Squeezers 48" between strain rods.
1—Mumford stationary air squeeze 14" x 18" platen.
2—Core Ovens, portable 4 shelves each, gas fuel.
1—Power Mixer for core sands etc. 1½ H.P. motor directly attached approx. 3 cu. ft. per batch cap.
1—Sly Cinder Mill for Cupola droppings or brass foundry skimmings.
1—F & M 25 H.P. horiz. oil engine Diesel type.
1—Ransohoff Patented Round, ¾" thick steel Tumbling Mill work chamber 48" x 48" with jacks separating device, for wet tumbling, with 10 HP 600 RPM A C motor and transmission for direct connection, nearly new.

We especially solicit Blowers, Exhausters and Fan inquiries in this season.

CLIFTON MACHINERY CO.
1023 W. 6TH, CINCINNATI, OHIO

SECOND HAND MACHINERY

COMPLETE SAND DRYER

Rotary drier 80" in diameter and 40' long. Also all necessary auxiliary equipment including conveyors, elevators, exhaust fan, motors, starters, etc. Address: Box 994, The FOUNDRY, Cleveland.

CUPOLA BLOWER

Piqua No. 5½, 4800 c.f.m. 16 oz. pressure at 210 R.P.M. Suitable for cupola melting from 10 to 20 tons per hour. Also 50 HP, 3 phase, 60 cycle, 440 volt motor 900 R.P.M. Starter compensator, belt and pulleys complete. Address: Box 150, The FOUNDRY, Cleveland.

CENTRIFUGAL COMPRESSOR

350/400 Cfm @ 35 lbs., 3 stage Allen & Billmyre, 6 x 6½ Centrifugal Compressor with 15 H.P. 3600 RPM AC motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE. CLEVELAND, OHIO

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo, Mich.

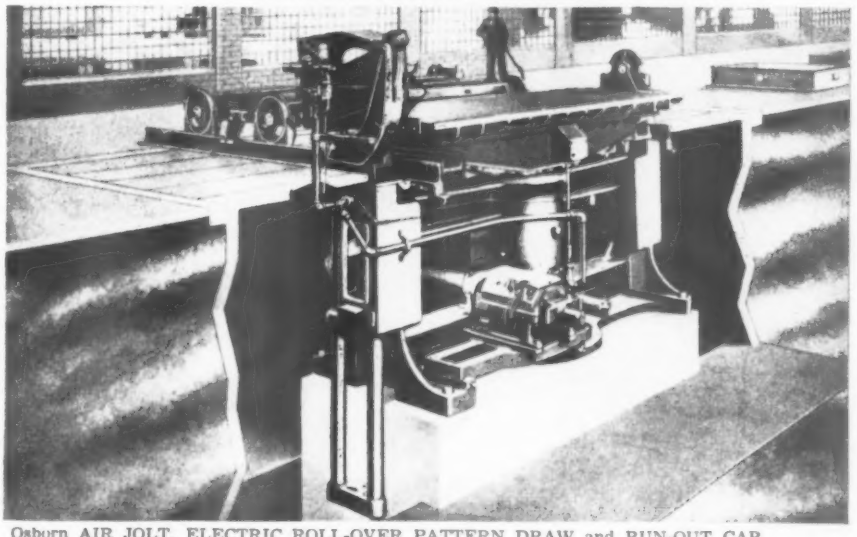
FOR SALE

One used Royer Sand Conditioner. Manufactured by Royer Foundry & Machine Co. Serial No. 33B2. Equipped with 8" belt. Address: D. J. Murray Manufacturing Co., Wausau, Wisconsin.

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

OSBORN MOLDING MACHINE

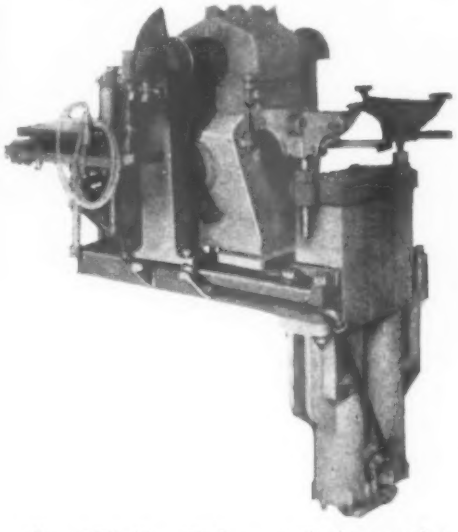


Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

INTERNATIONAL MOLDING MACHINES

International Type "F" comb. jar ramming power turn-over, power draw (late type enclosed cyl. model) 27 x 16" draw, 1600 lbs. cap. @ 80 lbs. press.

International Type "F" comb. jar ramming power turn-over power draw, 26 x 12" draw, 900 lbs. cap.

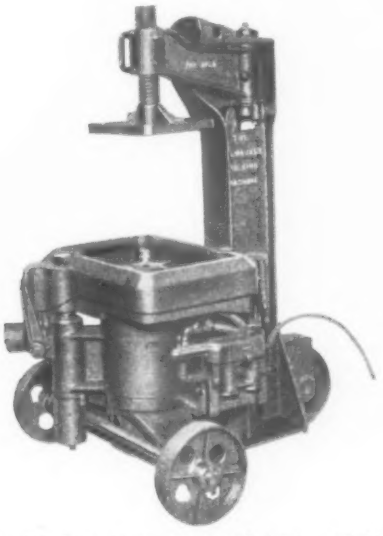


Type "F" 49 x 16" draw, comb. jar ramming, power turn-over and power draw, fitted with air equalizers, rollers in the draw section and hand operated core box clamps (rollers can be readily removed) jar plate 100" long, 6000 lbs. cap. @ 80 lbs. pressure.

Magnetic Mfg. Co. size 30" dia. x 80" long drum MAGNETIC SEPARATOR 115V 4.5 Amps. Type F-3, complete with shunt wound 3 HP DC 1700 RPM Motor, Elevator 10'4" O/A height, 18" width, 22" depth.

JOLT SQUEEZE STRIPPERS

No. 142 Milwaukee, stationary, 1200-lb. cap. @ 80 lbs., 6" draw, table 19 x 35"—open end type.



No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 35" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

NO. 2 DEMMLER CORE BLOWING MACHINES

MOLDING MACHINES

No. 49 Davenport jolt roll-over draw, outside flask cap. 50 x 72" pattern draw 18"—4500 lbs. cap. @ 80 lbs. pressure, jolt cyl. dia. 14".

No. 24 Davenport jolt roll-over draw, stationary, outside flask cap. 26 x 40"—10" draw, 1000 lbs. cap. @ 80 lbs. pressure.

Osborn No. 332 jolt roll-over and squeeze, flask cap max. length 36" width 26" pattern draw 9" jolt cyl. dia. 7", 750 lbs. jolting cap. @ 80 lbs. press., 44" between uprights.

HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

40 x 56" roll-over, 40 x 58" bumper, 3000 lbs. cap. @ 80 lbs.

AMERICAN SANDCUTTERS

American Fdry Model "K" heavy duty type, size 72, equipped with Buda Type "MU" 20 HP Gas Engine. 72" between tractor wheels, 6" face, having 60" cutting cyl.

Model "AA" size 62, 66" between tractor wheels, 4" face—O/A width 85" Length 96" and Height 80"—equipped with 4 cyl. Waukesha Gas Engine.

Cleveland-American (similar to Model "K") 84" spiral cutting cyl., 36" dia., 92" between tractor wheels, 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

EXHAUST TUMBLING MILLS

40" square x 84" long Sly, ⅞" plate door opening entire length of barrel, renewable trunnions, pulley drive.

LOT 34" dia. x 74" long Whiting, door opening entire length of barrel, renewable trunnions, clutch pulley drive.

OVERHEAD ELECTRIC TRAVELING CRANES

35-ton approx. 31'10" span Power House Type, 4-motors, 550V DC Motors, with Aux., Chain on Main Hoist, Cable on Aux.

10-ton approx. 30'7" span, 3-motor type, Northern Electrical 115V DC Motors, Hoist 15 HP 750 RPM, Rack 3 HP 1200 RPM, Bridge 7½ HP 950 RPM, EC&M Controllers, cage oper., 24" double "I" Beams, cast iron truck ends, chain lift (trolley drum can be regrooved for cable, if necessary).

Whiting BUCKET HANDLING DOUBLE DRUM CRANE, 4-motor type, cage oper., 230V DC Motors, drum type cont. approx. span 18'8" vertical clearance approx. 3'2"—7'0" track gauge end trucks have 15'0" wheel base.

3-ton MILWAUKEE 3-motor Type "C" GANTRY CRANE (suitable for 5-tons) 230V DC Motors, lattice type girders, structural end trucks, enclosed cage at one end, approx. span 31'6", lift 25 ft., overhang each side approx. 12 ft., single drum parallel with bridge girders, including ½ yd. single line perforated BUCKET for same.

ELECTRIC HOISTS

2-ton Northern Elec. Top Hook (can arrange for trolley—if required) floor control, approx. 18 ft. lift, speed 18 FPM, equipped with 5 HP 3/60/220 V AC Motor (suitable for 3 tons or more).

3-Ton Link-Belt single point suspension with Top Hook (or can add Trolley if required). Floor operated, mechanical lowering brake, 18' lift, speed 18 FPM, equipped with 115 volts, D.C. Motor, or can rewind for 220 V DC service.

4-ton Sprague Monorail Type "W" with motorized Trolley, 230 V DC Motors, double sheave-4-ropes, 25 ft. lift, speed 13 FPM, with open trailing cab.

5-ton Shepard Form 1 Class B-6 equipped with 6 HP 220V DC motor, floor control, 15 ft. lift, speed 15 FPM.

SCULLY MACHINERY & EQUIPMENT CORP.
(Formerly - Foundry Division of Scully Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO ILLINOIS

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A MIGHTY MITE

KNEE DEEP IN WAR PRODUCTION

Parsons

SAND BLAST CABINETS

Today as never before Parsons Sand Blast Cabinets are doing more than their share in blasting all war production records. Small—yes, but they pack a powerful bit of concentrated action that hits hard and clean, producing surface finish equal to that of far more expensive units. These machines operating on pressures from 20 pounds up and handling either sand or steel abrasives are adaptable to a wide range of work, paying for themselves in no time. Operation is practically continuous, as it is not necessary to stop for abrasive refilling. Cabinets are made in standard sizes, however, they can be "Tailor Made" to suit your individual requirements.

Send for free literature on our complete line of cleaning room equipment.

PARSONS ENGINEERING
CORPORATION
2545 EAST 79th STREET • • CLEVELAND, OHIO

Modern War Effort

requires

MODERN EQUIPMENT AND ENGINEERING

YOUR LABOR SHORTAGE CAN BE OVERCOME WITH MODERN PRODUCTS

Cupolas • Cupola Chargers • Covered & Insulated Ladles • Lifetime Geared Ladles • Improved Bottom Pour Ladles • Metal Pouring Systems • Crane & Monorail Systems For Metal & Mold Handling • Furnace Charging Cranes • Electric Mold Skin Driers

MODERN EQUIPMENT

PORT WASHINGTON WIS.
DEPT. 184

SOLVE YOUR

Parting Problems

WITH

Stevens PARTINGS

They insure

QUICK
CLEAN
LIFTS

"Everything for a Foundry"

SNO-WHITE PARTING—There's absolutely no danger from silicosis when Stevens Sno-White Parting is used. It contains less than ½ of 1% of silica. Sno-White is most economical, too. White in color, it is easier to see when dusted on and the sand or pattern is coated with less Parting actually used. Made light and fluffy by a special manufacturing process, which also removes all coarse particles, Sno-White is applied through fine mesh shake-bags. Thus, little is used, lifts are perfect.

MOL-DUST PARTING—A lime-free, phosphate base Parting—containing less than 5% total silica, with barely a trace of free silica. It is particularly adapted for use in aluminum and malleable iron foundries, as it will not cause black spots on aluminum castings nor pits in malleable iron castings. Also works well on molds for brass.

COLUMBIA PARTING—A genuine Tripoli Parting that can't be beat! Columbia Parting overcomes the tendency of the sand to stick or clog in the corners of the pattern, thus, even the most difficult and intricate lifts are easily and perfectly made. Gives excellent results on molds for gray or malleable iron, brass, bronze, aluminum and steel, working equally well on cold or hot sand.

LIQUID PARTING—

For use on metal and wood pattern plates. Not a sand-to-sand parting.

Here's a parting which meets the demand for a spray parting for metal pattern plates. It is transparent—light green color, with a pleasant odor. Can be applied by spray gun, brush or swab—and should be lightly wiped off immediately after applied. One application makes from 30 to 80 molds, depending on size and nature of pattern and coarseness of sand.

Stevens Liquid Parting is also an excellent core box parting, and ideal for *cleaning* and *preserving* core boxes. For cleaning—apply light coating and wipe off with a rag. For storing and preserving core boxes, apply lightly and *leave on.*

Your first order will put you on the list of regular users of Stevens Partings. Send it in TODAY.

FREDERIC B. STEVENS INCORPORATED

DETROIT • MICHIGAN

NEW ENGLAND . . . . . 166-182 Brewery St., New Haven, Conn.
NEW YORK and PENNSYLVANIA . . . . 93 Stone St., Buffalo, N. Y.
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The Arteries of Production

CONVEYORS SPEED THE FLOW OF WAR MATERIEL

● LOGISTICS . . . a military word . . . has its counterpart in Industry — it's CONVEYING. Getting materials, parts, assemblies and finished products from "here to there" in proper coordination with various steps in the production cycle, conserving power and time, multiplying production and aiding the worker, are the fundamentals of mass production.

Now, with a war to win, America is fortunate to have this technique so highly developed, with specialized types of conveyors to meet the widely diversified needs and conditions of industry.

Link-Belt Company has played an important part in this development, and Link-Belt Conveyors of every type are aiding countless war plants today to turn out more and still more urgently needed supplies for every phase of our war effort.

Link-Belt mass-production engineers are ready to confer with you on any conveying or sand preparation problem.

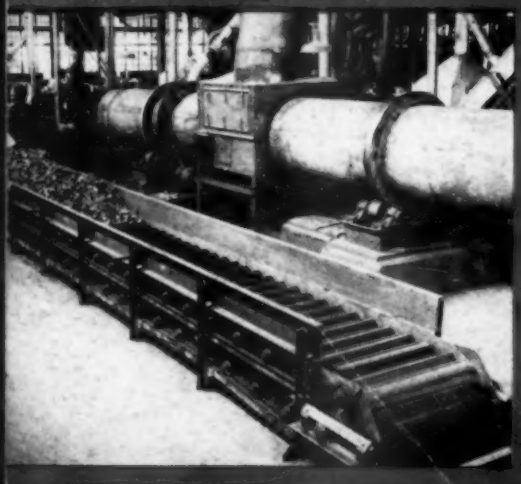
LINK-BELT COMPANY

Chicago Indianapolis Philadelphia Dallas
Atlanta San Francisco Toronto

Mechanical handling of molds on Link-Belt mold conveyors (several types to fit various conditions) through closing, clamping, pouring, cooling and shakeout operations, increases output and reduces manual effort.

Distributing belt conveyors with adjustable scraper discharge plows deliver prepared sand to any number of molding stations in proper quantities. Hoppers, gates, and chutes are adjustable to different types of molding machines and building clearances.

Molds move from finishing station on Link-Belt overhead trolley conveyor. Link-Belt conveyors of this type, being suspended from overhead, turn ceilings into producing areas—travel irregular paths at predetermined speeds to meet continuous production requirements.



Link-Belt apron conveyors handling hot castings from shakeout to continuous cleaning, sorting and cleaning to shipping. Years of trouble-free service under the rigors of high temperatures and abrasive action have proved their durability and efficiency.

Production molding machine line for magnesium castings. As in this installation proper design and layout of sand and mold handling equipment is a basic requirement to assure maximum utilization of man-hours and production from machine patterns.

LINK-BELT CONVEYORS